the gas fork truck that makes the fewest and shortest trips to the maintenance shop...

BAKER "FG"

Industrial trucks "out-of-service" mean dollars down the drain... not only repair dollars, but even more dollars for lost work. That's why we loaded the Baker "FG" gas trucks with features that mean substantially more time on the job. Here are a few:

Heavy-duty industrial truck engine operates at optimum RPM for least strain and abuse. Pistons are balanced to grams instead of ounces, crankshaft to 4 inch-ounces, connecting rods to 2 grams. Compact, rigid "power train" requires no troublesome universal joints. Clutch housing is split for better accessibility. Single oil supply lubricates entire assembly. Large full-floating, self-equalizing, self-energizing brakes have single-point adjustment.

Baker "FG" gas fork trucks, available in 2000, 3000, 4000, 5000, 6000 and 7000 pound capacities, are the only gas trucks with a full 6-months' warranty...an added assurance. Write for specific bulletins.

Baker®
handling equipment

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'ROUND ABOUT with the editors in field and office

Edited by R. L. Marinello

All-Engineers' Luncheon

ON THE SECOND day of the annual Plant Maintenance and Engineering Show and Conference, the American Institute of Plant Engineers will hold their fourth annual All-Engineers' luncheon. It will be held on Tuesday, January 29th, at the Hotel Cleveland, at 12 noon.

More information about this luncheon appears in this issue, along with a coupon which can be used to reserve your luncheon tickets. The price of the luncheon is $5.00 per person.

Standards on Air Moving and Conditioning Equipment

AT ITS ANNUAL meeting, the Air Moving and Conditioning Association approved standards and test codes for air moving and conditioning equipment.

These standards cover centrifugal, axial and propeller fans; steam and hot water unit heaters; de-humidifying air washers; central station air conditioning units; power roof ventilators; and residential type fans. Included in the standards are terms, definitions, operating limits, standard sizes, installation recommendations, specifications, etc.

Standard test code information includes data on definitions, testing instruments, determinations, observations and calculations, symbols and formulas and descriptions of various test set-ups. Information for testing prototypes of extremely large size fans by means of scale models has been added to the standards.

More information about these standards may be obtained by writing to the Air Moving and Conditioning Association, 2159 Guardian Bldg., Detroit 26, Mich.

Preparation Against Industrial Disasters

THIRTY ARTICLES covering all phases of industrial preparation against disaster have been collected into a special issue of the *Civil Defender*.

Just a few of the thirty articles are listed here to give you some idea of the variety of subjects discussed: Shelters in Industrial Plants; Protection of Vital Records and Documents; Emergency Repair and Restoration Following Disaster; Dispersal of Industrial Plants; What Some Companies Are Doing Now; and Accident Prevention and Emergency Planning.

Readers interested in obtaining a copy of this special industrial issue, entitled "Preparation for Peacetime and Wartime Disaster in Industry," should send their inquiry to Civil Defender, P. O. Box 1641, Mobile, Alabama. The price is $1.00 per copy.

Plant Engineering Changes

Edward H. Taylor, recently retired from his duties as plant engineer of The F. E. Myers & Bro. Co., Ashland, Ohio.

Robert W. Casciani, assistant plant engineer since 1952, has been promoted to plant engineer, and will take over Mr. Taylor's duties at the plant.

Mr. Taylor is a registered professional engineer in Ohio and plans to continue working as a consulting engineer. In serving with the company as plant engineer for over 30 years, he has been in charge of building design, construction and maintenance.

E. H. Taylor

R. W. Casciani

Mr. Casciani holds a Chemical Engineering degree from Ohio State University. He was a development engineer for Union Carbide and Carbon Co. before joining Myers in 1944. He first served as a design engineer for Myers and joined the plant engineering department in 1947. He was named assistant plant engineer in 1952. He is a registered professional engineer in Ohio.

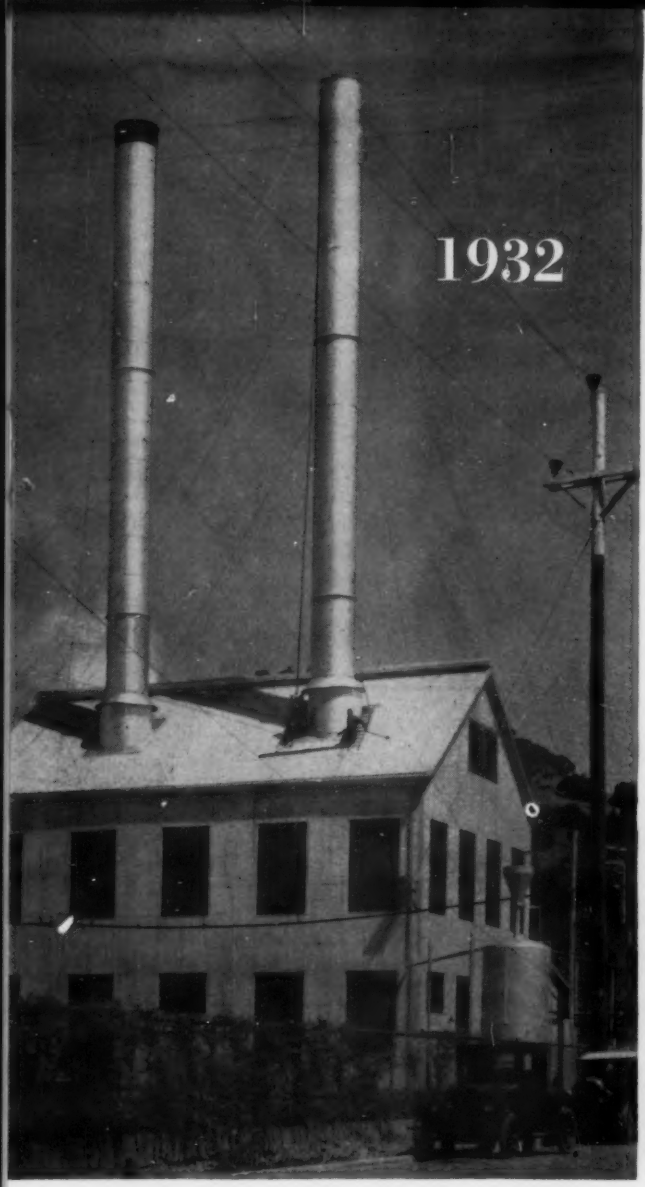
His duties as plant engineer will include plant engineering design, electrical maintenance (heat, light and power), machine repair and maintenance, millwrights, buildings and grounds maintenance, guards and janitorial services.

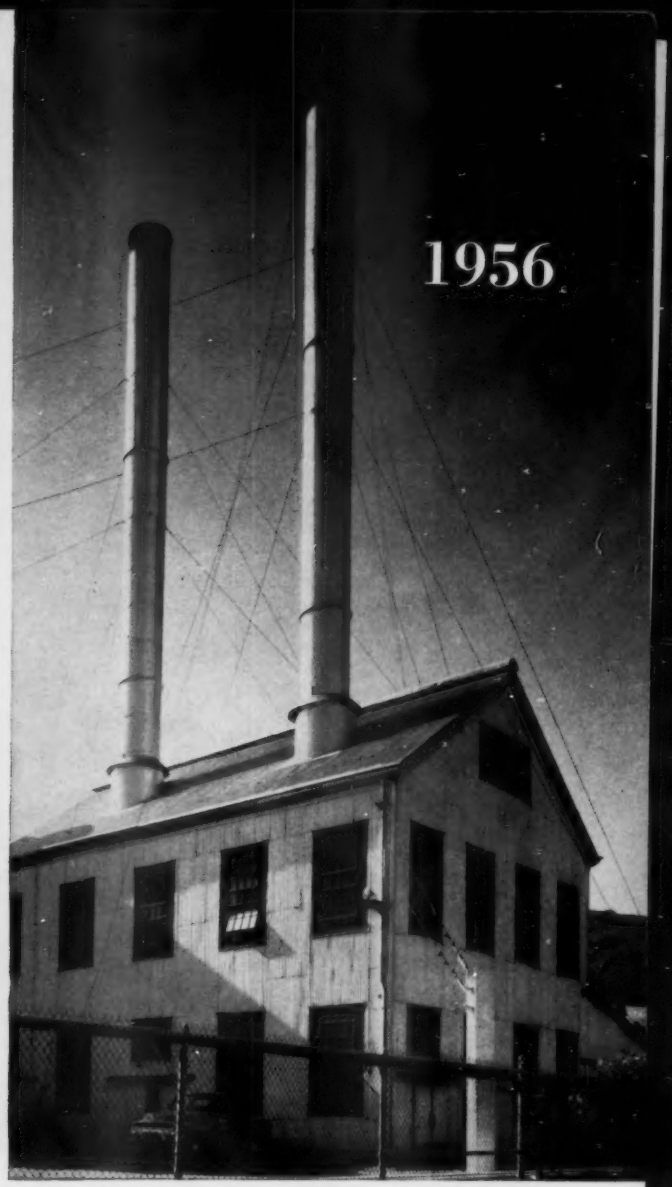
Abrasive Sandals

PLANT ENGINEERING:

"There are a number of places in our plant where wet floors create quite a hazard. As long as the rubber boots, which are worn by our employees, retain their roughness or tread, this hazard

Subscriptions: U.S.A. $10, Canada $11. Other countries $12 per year. Single copies $1. Change of address: Send to PLANT ENGINEERING, Circulation Division, Barrington, Illinois. Please supply position title, company name, company address. Request must reach us by 15th of month to make the change effective with following month's issue. Published monthly and accepted as controlled circulation publication at Chicago, Ill.





Installed 24 years ago.....still in excellent condition
Here's another Wrought Iron Plate durability story

After twenty-four years of service over boilers, these wrought iron stacks still rate a "no maintenance needed" inspection report.

These stacks, installed at San Rafael, California, Gas Plant of Pacific Gas & Electric Company, tell the kind of story repeated over and over again whenever wrought iron is used. It's a story of economy made possible because of wrought iron's unique defense against flue gas corrosion.

Byers wrought iron plate is an old campaigner in stack service. You'll find documented evidence of its endurance in our bulletin, *Wrought Iron for Flue Gas Conductors and Coal Handling Equipment.* Clear up a lot of questions about stack maintenance. Write us today for this helpful aid . . . it will pay you.

A. M. Byers Company, Pittsburgh, Pa. Established 1864. Division Offices in Boston, New York, Philadelphia, Washington, Atlanta, Chicago, St. Louis, Houston, San Francisco. International Division: New York, N.Y.

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BYERS *Wrought Iron Tubular and Hot Rolled Products*

ALSO ELECTRIC FURNACE QUALITY STEEL PRODUCTS

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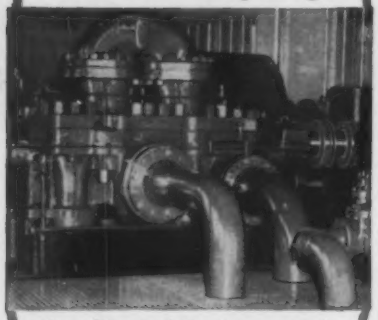
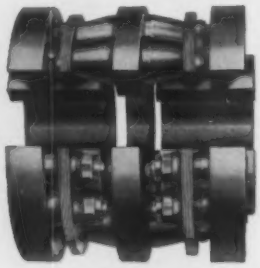
PROTECT YOUR PUMPS with THOMAS Flexible Couplings



One Chemical Engineer reports he formerly spent 95% of his time supervising repacking of pump glands. Then he installed Thomas Flexible Couplings. Now his pumps need no attention.



Only THOMAS Flexible Couplings offer:

UNDER LOAD and MISALIGNMENT

1. No Cross-pull on Bearings or Gland.
2. No End-thrust on Bearings or Impeller.
3. Freedom from Backlash—Torsional Rigidity
4. Free End Float
5. Smooth Continuous Drive with Constant Rotational Velocity
6. Visual Inspection in Operation
7. Original Balance for Life—*and*

THOMAS ALL-METAL COUPLINGS HAVE NO WEARING PARTS SO THEY REQUIRE NO LUBRICATION AND NO MAINTENANCE

Write for Catalog 51A

THOMAS FLEXIBLE COUPLING CO.

WARREN, PENNSYLVANIA, U.S.A.

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'ROUND ABOUT

is held to a minimum. However, when the boots become worn and smooth, they must be replaced. This, of course, becomes quite expensive.

"We are wondering if you could refer us to a manufacturer of a sandal with an abrasive sole that could be worn over rubber boots." *H. D. Hamilton, Seymour Foods, Inc., 609 Quincy Street, Topeka, Kansas.*

► We have been unable to locate the manufacturer of the type of abrasive sandal you mention. We would like to suggest that you get in touch with Minnesota Mining and Manufacturing Co., for information on their skid-proof tapes which could possibly be applied to the worn boots. If any readers were confronted with a similar problem and can offer some suggestions, Mr. Hamilton would certainly appreciate hearing from you.—*Editors.*

Maintenance Expenditure To Double In Next 10 Years

IN THE NEXT 10 years American industry can expect to double its present maintenance expenditure of $11 billion annually.

J. J. Durkin, an executive of General Electric's Service Shops Department, said many billions more will be spent unless correct maintenance procedures are put into effect to prevent down-time losses.

Speaking to the New York University chapter of the American Institute of Industrial Engineers, Mr. Durkin pointed out that the growing complexity of manufacturing processes increases the importance of the maintenance function.

He also stated that more maintenance know-how and specialized skills will be required to take care of the complex industrial equipment being subjected to heavier duty cycles.

New Appointment for Cuno

Curt W. Cuno, has been appointed plant engineer of General Electric's Semiconductor Products Department, Syracuse, N. Y. He will be responsible for all plant engineering activities of the Department.

Mr. Cuno is a native of Leipzig, Germany, and was graduated in 1923 from the University of Dresden with a degree in Electrical Engineering. The same year he emigrated to the United States and joined the General Electric Co. at Schenectady, N. Y.

Until 1942, he was in charge of all electrical testing equipment at the Schenectady Works. In 1942, he joined the former Tube Division of the company and was in charge of all manufacturing facilities. In 1945, he stepped up to the post of plant engineer for the former Electronics Division, a position he held until his most recent appointment as plant engineer for the Semiconductor Products Department.

While he was plant engineer for the Electronics Division, he laid out and supervised the construction of the Electronics Park at Syracuse and the installation of manufacturing equipment and facilities.

Ventilation Conference

PLANT ENGINEERS with a ventilation problem may find the answer at the annual Industrial Ventilation Conference. It will take place February 18th through the 21st at Michigan State University, East Lansing, Michigan.

Problems relating to fans, exhaust hoods, make-up air and general plant ventilation will be discussed during this four-day conference. The program is arranged to include informal talks and demonstrations as well as individual design problems typical of those found in industry.

Further information about this conference may be obtained by writing to Industrial Ventilation Conference, Continuing Education Service, Michigan State University, East Lansing, Michigan.

1955 Issues on Microfilm

MICROFILM PRINTS of the 1955 issues of PLANT ENGINEERING, Volume 9, are now available for company files. The cost is $8.00, plus postage.

This volume or any of the previous volumes of PLANT ENGINEERING can be obtained from University Microfilms, Ann Arbor, Michigan.

Please note that distribution of these films are limited to firms and individuals on our controlled and subscription lists.

Civil Defense Publications

HAVE YOU taken every precaution to protect the plant's facilities in case of a possible disaster? If you haven't and would like information on what should be done to provide shelters, protect vital records, plan for emergency repairs, etc., there are several booklets which list helpful reference material and tell where to write for it.

Civil Defense Technical Bulletin, TB-16-3 (Revised) June, 1956—This bulletin lists a number of civil defense publications. To give you an idea of the areas covered, here are the titles of some of the publications: Civil Defense in Industry and Institutions; Evacuation Checklist; Fire Hazards and Safeguards for Metal Working Industries; and Industrial Defense Planning Manual.

Copies of the bulletin may be obtained by writing to the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C. Price five cents.

Civil Defense Publications—The Government Printing Office also publishes this eight-page booklet, listing handbooks, bulletins and technical manuals dealing with civil defense.

NOW... greater piping loads, longer travels, with less headroom

The Grinnell Model R Constant-Support Pipe Hanger is available now in an *extended range* of sizes to provide completely overlapping coverage of loads from 47 lbs. to 32,267 lbs., and with travels up to 12 inches. New design modifications permit these hangers to be installed with a minimum of headroom, ranging from 29 inches (rod take-out) for the largest size — down to 10¾ inches for the smallest size.

The Model R provides constant support which is mathematically perfect for all positions of travel. This constancy of support is maintained throughout the full range of field adjustability. Needle bearings minimize friction.

Grinnell Constant-Supports are individually calibrated to support the exact load specified. All Model R Constant-Supports have a full 70 percentage points of field adjustability built into them. No less than 10% of this adjustability is allowed either side of calibration for plus or minus change in load. Field re-adjustments are easily made by turning a single load adjustment bolt.

Grinnell designs, manufactures, and distributes a complete line of pipe hangers and supports for every piping requirement. Grinnell maintains an experienced staff of engineers in the field — ready to assist you on the job with any piping problem.

GRINNELL

AMERICA'S #1 SUPPLIER OF PIPE HANGERS AND SUPPLIES

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pipe and tube fittings • welding fittings • engineered pipe hangers and supports • Thermolier unit heaters • valves
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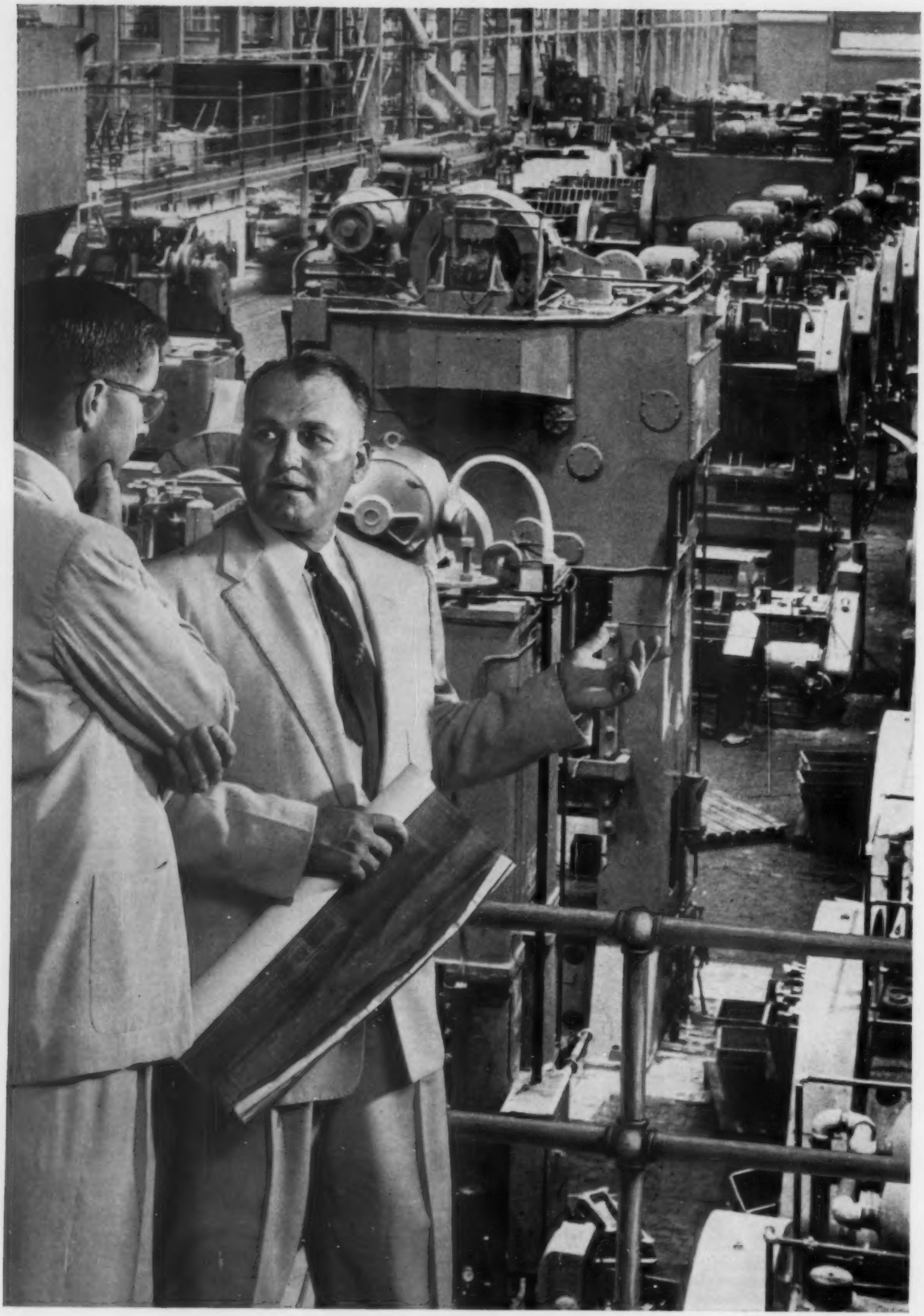


"What would you say if your boss asked . . .

'Are we ready for automation?'"

"Two years ago I didn't know the answer when the boss asked me, 'Are we ready for automation . . . electrically?'

"As plant electrical services engineer I had to come up with the answer . . . and it was a real surprise. Much of our electric equipment was antiquated and took up a lot of valuable production space. The power supply wasn't as safe, dependable or flexible as we wanted it . . . maintenance costs were soaring.

"We had spent so much time improving manufacturing processes and methods that we had neglected electrical needs. Result . . . we weren't even up to date, let alone prepared for automation.

"Steps were taken immediately to make sure our plant was adequate electrically. Today it has more automatic equipment and work-handling devices, and is equipped for more advanced types of automation. Electrical adequacy is being designed into our new branch plant, too.

"There's no reason why you can't do the same to make your plant more efficient." J-96100-1X

Industry has electrical adequacy problems . . .

Surveys show that many of the nation's plants are inadequate electrically. A recent study of 42 plants in a given area revealed 88% had electrical problems that interfered with production.

These Problems Can't Wait

	Percent of Plants Inadequate — Electrically*
Inadequate transformer capacity and flexibility	42%
Questionable breaker interrupting capacity	63%
Lack of power centers	62%
Poor power factor	25%
No motor control centers	42%
No plug-in bus duct	32%
Low primary distribution voltage (below 4160 volts)	49%
Low secondary voltage (below 480 volts)	25%
Lack of network distribution systems	90%
Lack of automatic switching to maintain continuity	69%
Absence of 277-volt lighting	94%

*Based on report of survey in 156 top U.S. plants conducted by *Factory* magazine.

WATCH WESTINGHOUSE!

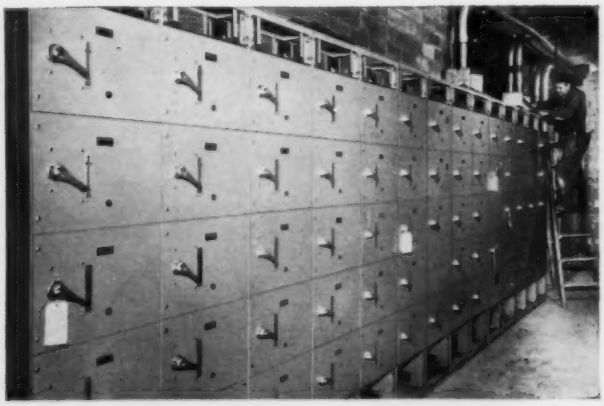
*WHERE **BIG** THINGS ARE HAPPENING **TODAY!***

"I called in Westinghouse...

We got dependable, flexible power supply for greater productivity"

Westinghouse switchgear is available in 10 basic units with a selection of standard instrument panels . . . future additions or replacements can be made easily and quickly any time.

Westinghouse dry-type transformers save space, mount conveniently in out-of-the-way places. Well suited for wet, dirty or hot locations. Placement close to work load saves long, costly secondary runs.



Expansion with Westinghouse control centers frequently saves as much as 40% on installation costs over decentralized methods of mounting motor control. Inspection and service are simplified.

"When I found what some of our troubles were, I called in some expert help from Westinghouse. Working with our staff and our consulting engineers, Westinghouse further studied the condition of our plant power distribution system . . . its construction, age and state of repair.

Switchgear improved safety, operating continuity

"We installed Westinghouse low-voltage, metal-enclosed switchgear which had high interrupting capacity for safety and operating continuity. This reduced our maintenance, brought economic advantages and freedom to expand our facilities.

"Unitized switchgear reduced special design and engineering expense for our new installation, and also provided custom-built preciseness in meeting our application requirements.

Capacitors paid for themselves in 18 months

"Capacitors were carefully applied with Westinghouse help at the substation bus, on secondary bus duct, and right at the motor loads. In the first year, savings on our power bill amounted to 75% of capacitor installed cost. Capacitors paid for themselves in 18 months, and savings are still being realized.

"The capacitors reduced the burden on our feeders and released electrical capacity for other needs. We got better voltage regulation at our motor and lighting loads.

Transformers gave us power . . . where we wanted it

"Placing Westinghouse transformers strategically throughout our plant gave us power close to the load . . . conveniently, economically. Oil- and askarel-filled units were used where we needed high-impulse levels, while dry types were used when light weight, and ease of installation were key factors.

System flexibility with packaged control

"Some of our machines were subject to frequent moving, so we used Westinghouse plug-in bus duct with individual controls at each machine. For our permanent arrangements, we used control centers for simplicity in planning and installation, a high degree of safety and flexibility, centralized operation and maintenance. In both cases, we found that Westinghouse packaged control equipment simplified system design, cut our costs up to 40%.

"Why not call Westinghouse . . . like I did?"

"I'm sure you'll find Westinghouse a real lifesaver in helping out with your plant power distribution systems, too. Their engineering team will gladly work with your staff and your consulting engineers. I got our plant on the road to electrical adequacy by getting in touch with my local Westinghouse representative."

For more information call your local Westinghouse sales office or send coupon. Westinghouse Electric Corporation, 3 Gateway Center, P. O. Box 868, Pittsburgh 30, Pennsylvania. J-96100-2X

Westinghouse capacitors are low in initial cost, require no maintenance, save additional investment in transformer capacity. Solder-sealed porcelain bushings protect against leaks or contamination of dielectric.

WATCH WESTINGHOUSE!

*WHERE **BIG** THINGS ARE HAPPENING **TODAY!***

Westinghouse Electric Corporation
3 Gateway Center, P. O. Box 868
Pittsburgh 30, Penna.

☐ I would like a showing of the 20-minute film, *Selecting the Right Industrial Distribution System.*

I'm interested in more information about:

☐ Switchgear ☐ Capacitors
☐ Transformers ☐ Controls

NAME _____ TITLE _____

FIRM _____

ADDRESS _____

CITY _____ STATE _____

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No
PLUNGER ELECTRIC
installation
is too
large

NEW BOOKLET

Booklet A-414 describes the NEW Otis Plunger Electric Freight Elevator designed for low-rise, light and heavy duty freight handling requirements. We'll be glad to send this booklet to you.

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ELECTRIC • PLUNGER ELECTRIC

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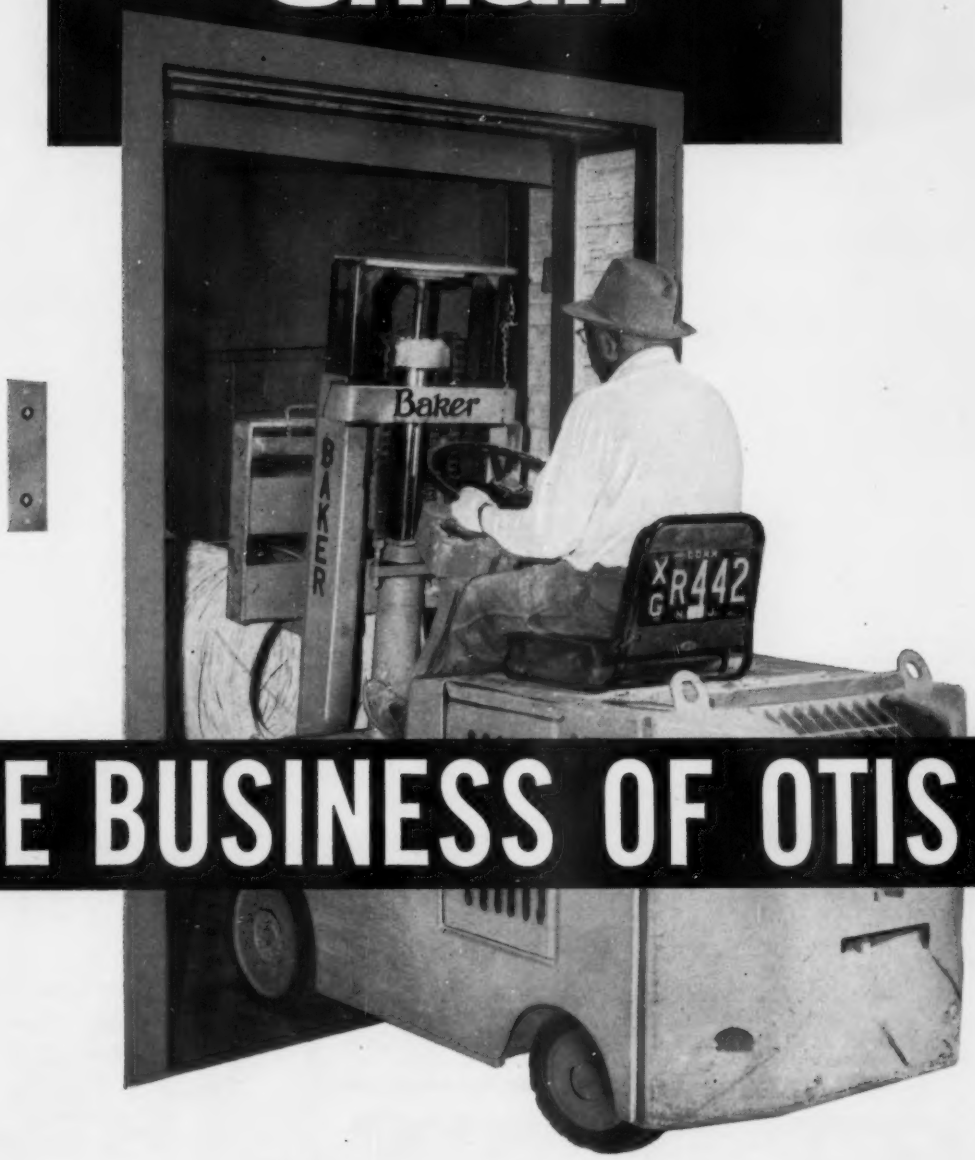
LIGHT, GENERAL, AND HEAVY DUTY

ELECTRIC DUMBWAITERS

OTIS ELEVATOR COMPANY • 260 ELEVENTH AVENUE • NEW YORK 1, N.Y.

No
PLUNGER ELECTRIC
installation
is too

small



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OFFICES IN 297 CITIES ACROSS THE UNITED STATES AND CANADA

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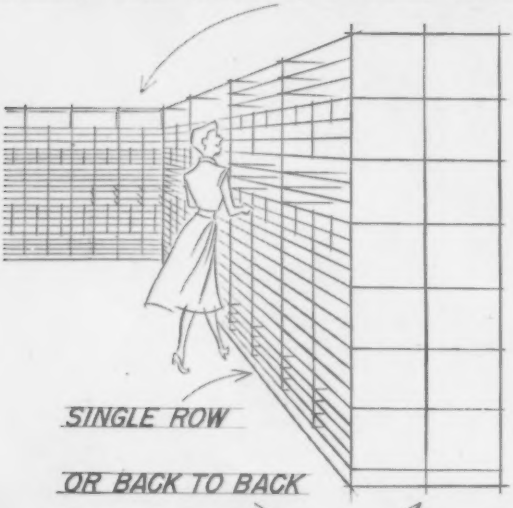
HOW TO USE HALLOWELL STORAGE WALLS IN MAKING ECONOMICAL STORAGE SPACE

STACK THEM AGAINST WALLS
-AS HIGH AS YOU WANT
-AS LONG AS YOU WANT

USE THEM TO BUILD PARTITIONS OR WALLS



SINGLE ROW

OR BACK TO BACK

SET THEM UP ADJACENT TO MACHINES AND OTHER WORK AREAS TO STORE BOOKS, TOOLS, PARTS, ETC.

Prime Cold Rolled Steel · All Welded and Finished with Baked-on Enamel · Interchangeable Drawers · 3 Different Size Drawers Can Be Intermingled in the Same Case · Stocked by Leading Shop Equipment Dealers · Send for Bulletin 2110 · Hallowell Shop Equipment Division, Standard Pressed Steel Co., Jenkintown 26, Pa.

HALLOWELL SHOP EQUIPMENT DIVISION
STANDARD PRESSED STEEL CO.
SPS
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BENCHES (CABINET, WORK, UNIT) • STOOLS AND CHAIRS • SHOP DESKS • TOOL STANDS AND CABINETS • DRAWERS, DRAWER TIERS • STEEL CARTS • SHELVING

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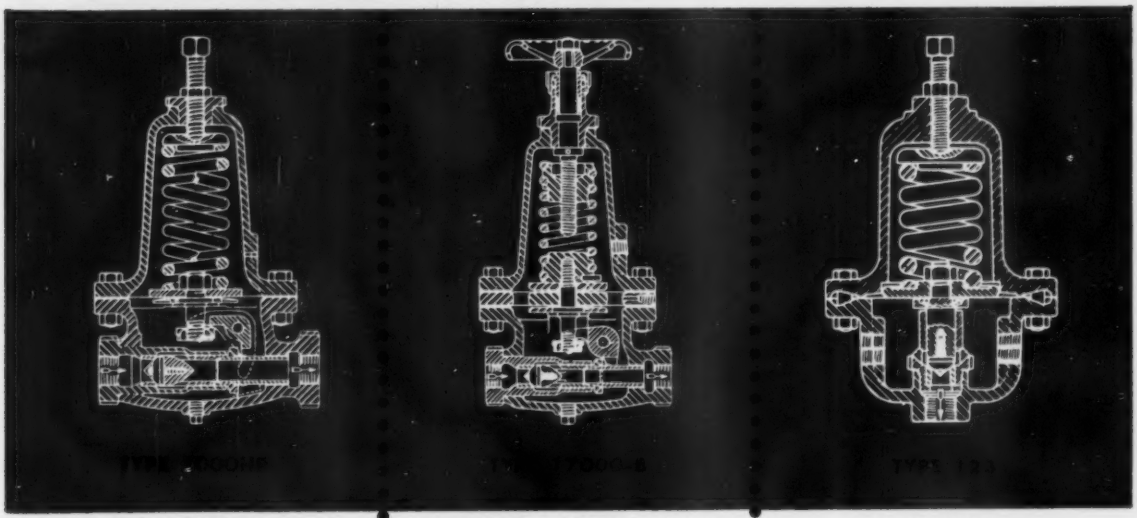
YOUR CONTROL PROBLEM?

You'll find the Answer in

CASH STANDARD

Steam . . . Water
Air . . . Gas . . . Oil
REGULATORS FOR POWER
☑ GENERATION
☑ DISTRIBUTION



PRESSURE REDUCING VALVE

A streamlined high capacity valve for close pressure regulation—accurate even under toughest working conditions. Closes against the flow, eliminating conditions that cause chatter. Two types available: for high pressures and for low pressures. Recommended for steam, water, air, oil and most gases and chemicals. Screwed ends, sizes: ¼" to 2".

DIFFERENTIAL CONTROL VALVE

Maintains constant differential pressure between atomizing steam and fuel oil. Non-rising type adjusting screw adjusts spring either under tension or compression for maintaining steam above or below fuel oil pressure, depending on type of burner employed. Iron, bronze or steel body; bronze or stainless steel trim. Screwed ends, sizes ¼" to 2" with expanded outlets when desired.

RELIEF VALVE

Maintains a desired inlet pressure by relieving into relief line provided or protects equipment against high pressure line surges. For water, oils, air, gases, slurries and many other fluids. Bottom connection is outlet or discharge connection. Two side inlet connections permit installation in the line or as an angle valve with one side inlet plugged. For relief pressures to 325 lbs. and temperatures to 500° F. Screwed ends, sizes: ¼" to 2", flanged ends, size ½".

Cash Standard
Stacon Series V Self Operating Temperature Regulators

Type 57
Recording Controllers

Type 30
Diaphragm Control Valve With Type 51 Indicating Controller Mounted

Type 44
Pilot Operated Pressure Regulator

Type 100
Positioning Controller

Contact the Cash Standard control specialist in your area or write Dept. D

CASH STANDARD

A. W. Cash Co. and Its Subsidiary, Cash Standard Stacon Corp.
P. O. Box 551, Decatur, Ill.

PRESSURE, HYDRAULIC, TEMPERATURE, PROCESS AND COMBUSTION CONTROLS

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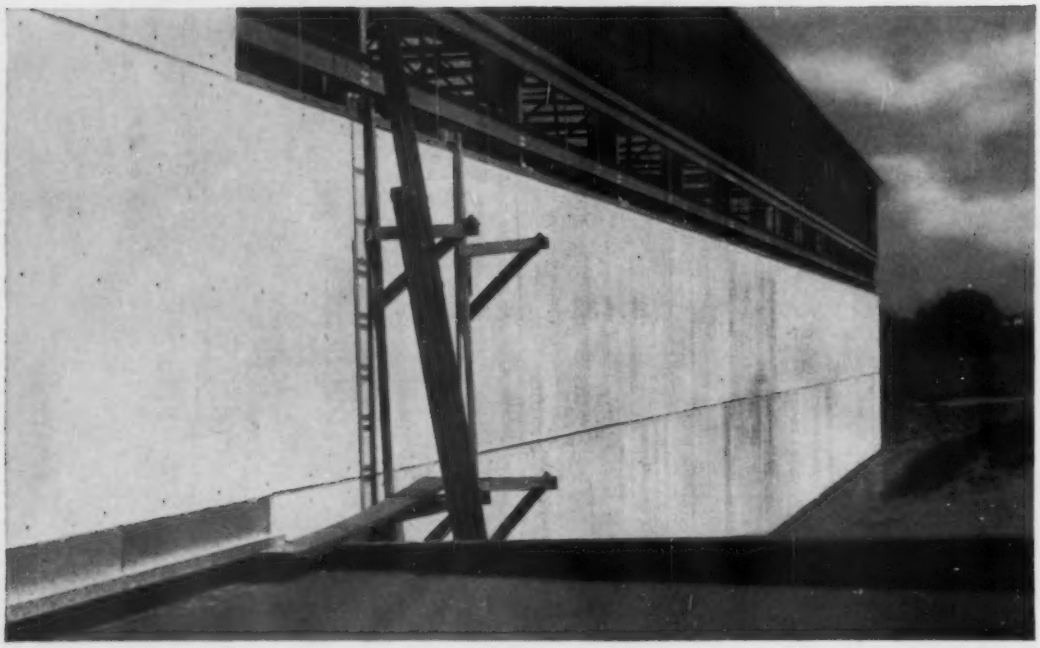
Johns-Manville **TRANSITOP**® Structural Panels meet the trend to modern panelized construction



Transitop Panels offer maximum coverage... minimum erection cost

THE MOST striking change in building construction methods in recent years has been the trend toward prefabricated building panels.

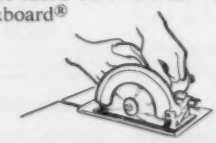
This is particularly true in the construction of panelized curtain walls for buildings, large and small. Although curtain wall construction in skyscrapers has been widely publicized, this method of construction is just as applicable to smaller buildings such as schools, hospitals, office buildings, motels and shopping centers. Today, paneled curtain walls probably exceed all other applications in popularity and are rapidly becoming the standard method of building construction.

Johns-Manville Transitop offers architects, designers and builders a simple and economical method of providing panelized curtain walls. Transitop is durable, weather resistant, requires minimum maintenance. As a curtain wall, Transitop provides high structural strength, reduces the dead load, increases usable floor space, provides adequate insulation and is easy to erect. Panels are easily applied over wood or steel framing.

The same advantages that make Transitop so suitable for panelized curtain wall construction also make it equally ideal for roof deck construction.

J-M Transitop is a complete 4′ wide by 8′, 9′, 10′, or 12′ long unit, in $\frac{11}{16}$″, 1⅛″, 1⅜″, or 2″ thicknesses. It consists of an integral impregnated insulating board core faced on two sides with Asbestos Flexboard® sheets.

- Facings of tough, weatherproof asbestos-cement Flexboard
- Core of integrally impregnated insulating board
- Waterproof adhesive bonds core to Flexboard sheets



- Transitop is cut to fit and installed with ordinary construction tools

For information on Transitop, write Johns-Manville, Dept. PE, Box 158, New York 16, N. Y.

JOHNS MANVILLE JM PRODUCTS

Johns-Manville

For more facts circle 510 on Reply Card

American Blower
Ventura Fans
offer you

top performance and economical ventilation

American Blower Model K Ventura Fan

You can count on American Blower Ventura Fans to do the job they are designed for, with high efficiency and a minimum of maintenance. They are built for long life and top performance. All ratings are certified.

American Blower Model K Ventura Fans are ruggedly constructed, heavy-duty propeller fans for tough industrial applications. They offer the power you need . . . when you need it, and will operate against static pressures up to ⅝". Request Bulletin 6514.

American Blower Ventura Fans are attractively designed, quality built, and easy to install . . . *yet competitively priced.* Ventura Fans come in a wide range of sizes and capacities — with constant-speed and two-speed direct drives, totally enclosed motors — to satisfy your exact requirements.

CERTIFIED RATINGS

Certified ratings are the result of tests made by the Manufacturer in accordance with the Standard Test Code for Vaneaxial, Tubeaxial and Propeller Fans adopted jointly by the National Association of Fan Manufacturers, Inc. and the American Society of Heating and Ventilating Engineers.

AUTHORIZED BY N A F M

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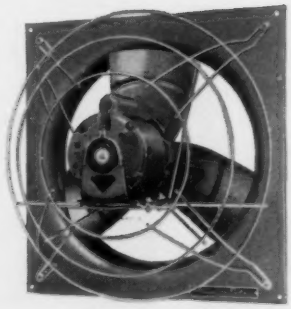
Certified Ratings

AMCA

MEMBER OF PFMA



Model G Ventura Fans

Model G, at left, is a sturdily built and attractive fan suitable for light industrial duty and commercial applications. It is especially quiet-operating, making it ideal for offices, stores, and lobbies — or wherever quiet operation is required. Write for your copy of Bulletin 6414, which gives complete performance data.

American Blower products serve industry

Air Conditioning, Heating, Ventilating Equipment
Mechanical Draft Equipment
Industrial Fans and Blowers
Centrifugal Compressors
Gyrol Fluid Drives
Dust Collectors

AMERICAN BLOWER CORPORATION, DETROIT 32, MICHIGAN
CANADIAN SIROCCO COMPANY, LTD., WINDSOR, ONTARIO
Division of American-Standard

AMERICAN BLOWER

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GENERAL ELECTRIC LIMITAMP* STARTERS OFFER 30"-DEEP ENCLOSURES WHICH CUT SPACE NEEDS IN HALF

Today you can install General Electric air-break Limitamp starters in half the space normally required by the old-style, 60-inch-deep, high-voltage motor control. In addition to the small compact enclosure (30" deep, 38" wide, 90" high), Limitamp control units are designed for complete front connection, thus eliminating the need for a back aisle. These two features of Limitamp starters assure maximum utilization of available floor space.

Front connection of General Electric Limitamp control also means greater flexibility of arrangement. Units can be mounted back-to-back, back-to-wall, or free standing.

ONLY LIMITAMP CONTROL OFFERS ALL THESE FEATURES

Space savings and flexible arrangement of units are but two of the benefits of G.E.'s Limitamp control. There are many more. For instance:

- Easy installation made possible with roll-out contactor unit and front-connected devices.
- Increased personnel safety provided by three-phase disconnect switch.
- Extra five-square-foot space savings on large motor applications by using higher-capacity fuses to eliminate need for extra fuse cabinet.
- Completely co-ordinated electrical design to give optimum equipment protection.

TAKE ADVANTAGE OF THESE BENEFITS NOW

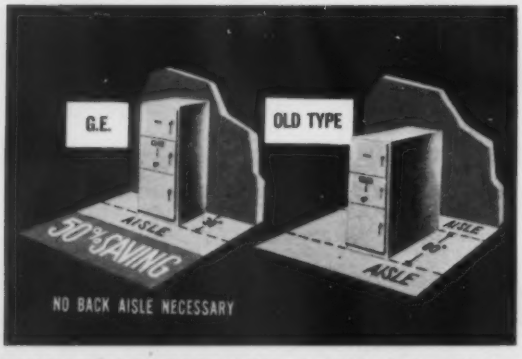
Don't be satisfied with "old-fashioned" high-voltage motor control: specify General Electric's Limitamp control—*leader in design and performance.* Contact your G-E Apparatus Sales Office today, or write Section 783-3, General Electric Company, Schenectady, New York.

Industry Control Department, Roanoke, Virginia

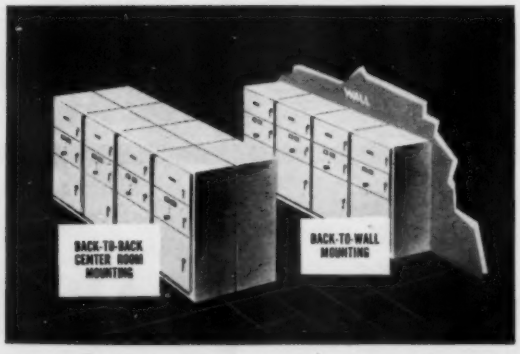
*Reg. Trade-mark of General Electric Company.

Progress Is Our Most Important Product

GENERAL ELECTRIC



ELIMINATION OF BACK AISLE plus 30-inch-deep Limitamp control units results in floor space savings of 50%.



FLEXIBLE ARRANGEMENT—back-to-back, back-to-wall, or free standing—since units are front connected.

..LEADER IN DESIGN AND PERFORMANCE

For off-the-ground painting, cleaning, electrical work, window washing and inspection "Trouble Saver" ® Sectional Rolling Scaffolds offer efficient working space and maximum safety. "Trouble Saver" fixed or rolling Scaffolds are easily erected from interchangeable prefabricated 5'-wide frames and crossbraces plus guardrails. Rubber-tired casters have positive lock.

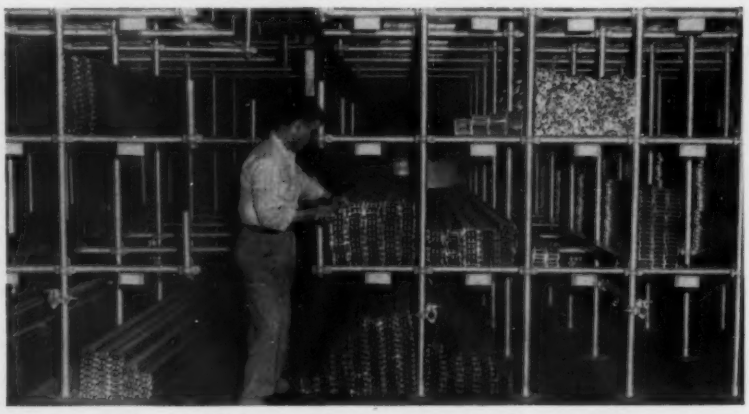
Versatile PS Co. Scaffolding can prevent accidents while

Making Plant Maintenance Easier and Less Costly

Painting, window washing and other light-duty work is fast and safe when done from this "Gold Medal" ® Midget Swinging Scaffold raised and lowered by a light, compact machine and 1/4" steel wire rope.

Demountable stands of any size or shape for maintaining and servicing all types of plant equipment can be made from "TubeLox" ® tube and coupler Scaffolding. "TubeLox" consists of just four basic parts.

Ability to conform to odd shapes and uneven terrain and surfaces makes "TubeLox" Scaffolding valuable on difficult industrial maintenance jobs. It is extensively used by refineries.



Neat, strong, easy-to-get-at storage racks for tubing, pipe and bar stock in plants and warehouses are made from versatile "TubeLox" Scaffolding. With these interlocking tubes and couplers, bays can be made any height or width, and can be disassembled and reinstalled at other locations with other size bays.

Write for free copy of "Controlling Costs", Bulletin G205R. Also, see the Yellow pages of your 'phone directory for the nearest Patent Scaffolding Co. office or representative that sells or rents "Gold Medal" Scaffolds.

FOR GREATER SAFETY...EFFICIENCY...ECONOMY

THE PATENT SCAFFOLDING CO., Inc.

38-21 12th St., Dept. PE, Long Island City 1, N. Y.

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JalKlamp splices

have full rope strength

Now you can cut wire rope sling costs and still get stronger, safer slings with JalKlamps, the new special alloy sleeves for wire rope splicing.

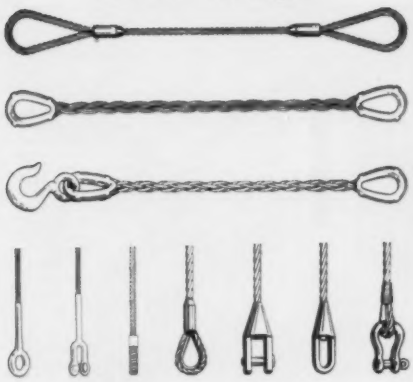
When hydraulically pressed around the rope, the JalKlamp's non-corrosive alloy actually flows into every space between the wires and between the strands of the rope. Result: a neat, permanent, watertight splice that develops the full strength of the rope.

JalKlamp slings and terminals are available in all standard wire rope constructions with diameters from ⅛″ to 2″. They're part of a full line of JalFlex Slings and Fittings including all types of braided slings and swaged fittings that can meet your individual wire rope assembly requirements.

Write for complete information on the JalFlex Slings and Fittings today.

Designs for Every Need

JalFlex Slings and Fittings



Jones & Laughlin

STEEL CORPORATION · PITTSBURGH

J&L STEEL

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MODERN OIL AND GAS FIRED BOILERS

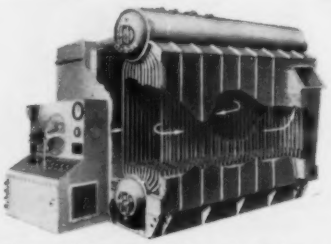
The boilers illustrated here cover the broad capacity range from 4,000 to 600,000 lb of steam per hr. They are all especially designed for gas and/or oil firing. The two units illustrated at right (Types VP and VU-55) are standardized and each is available in several sizes. The capacity range covered by these two units is from 4,000 to 120,000 lb per hr. The two units below are custom designed for various capacity, pressure and temperature requirements up to 600,000 lb per hr, 1400 psi and 950 F. All these units are pressure fired and do not require induced draft fans.

Collectively, they offer an exceptional diversity of choice. A brief consideration of the features of each type will help you "pinpoint" the design characteristics best suited to your particular needs.

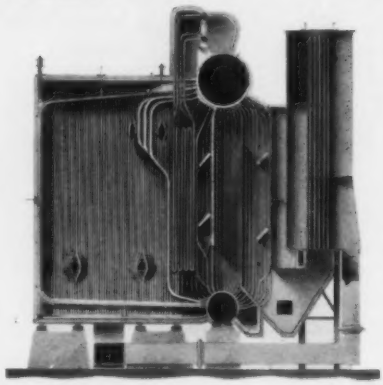
Of course there are other C-E two drum Vertical-Unit Boilers available for pressures up to 1400 psi and temperatures up to 960 F. Shown here are but four popular members of the C-E family of Vertical-Unit Boilers—a family which has achieved a wide measure of acceptance using all types of fuel.

Please feel free to call on us for further detailed information. Catalogs are available upon request.

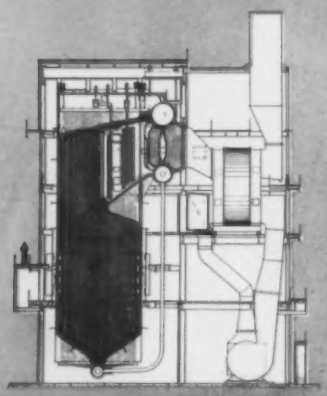
B-922-A



C-E Package Boiler — Type VP Completely shop assembled . . . available in fourteen sizes from 4,000 to 40,000 lb capacity . . . pressures to 500 psi. Available with integral console control panel, this unit contains more water-cooled area per cubic foot of furnace volume than any other boiler of its size and type. It can be equipped with any of several approved burners.

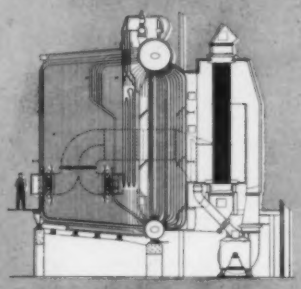


C-E Vertical Unit Boiler — Type VU-55 Available in six sizes . . . capacities from 50,000 to 120,000 lb steam per hour . . . designed for two pressure ranges, 250 psi and 500 psi, and total steam temperatures up to 750 F. This double cased, gas-tight unit is equipped with tangential burners. A large (60-inch) steam drum assures generous water capacity and steam reservoir space. Tangent tube waterwalls offer complete furnace protection, minimizing maintenance.



C-E Vertical Unit Boiler — Type V2

This unit is available for capacities from 200,000 to 600,000 lb per hr. It can be designed for pressures up to 1400 psi and for temperatures to 950 F. Tilting tangential burners, providing superheat control, are standard equipment although horizontal burners are available, if desired. A double, gas-tight casing assures lifetime tightness and minimum heat loss. Heat recovery equipment can be furnished as desired.



C-E Vertical Unit Boiler — Type VU-50S

This unit is available for capacities from 50,000 to 400,000 lb per hr—pressures to 1400 psi and temperatures to 950 F. This bottom-supported design uses tilting tangential burners providing effective superheat control. Horizontal burners can be furnished if desired. Heat recovery equipment as required. This unit makes available to industrial installations a standard of performance comparable to utility practice.

COMBUSTION ENGINEERING

Combustion Engineering Building

200 Madison Avenue, New York 16, N. Y.

STEAM GENERATING UNITS · NUCLEAR REACTORS · PAPER MILL EQUIPMENT · PULVERIZERS · FLASH DRYING SYSTEMS · PRESSURE VESSELS · HOME HEATING AND COOLING UNITS · DOMESTIC WATER HEATERS · SOIL PIPE

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BULLETINS just released and of immediate plant interest

Reader Service Cards for ordering bulletins are on pages 195-196. Be sure to include your name, job title, and company.

PIPING, VALVES, FITTINGS

101 On Prefab Piping—Catalog 100, 28 pp, describes prefabricated insulated piping systems (underground and overhead) for steam, condensate, hot or chilled water and other fluids. Covers design, applications, and installations of these systems and includes technical data. Designs for various requirements are listed—simple or multiple inner pipe, casings of flanged cast iron, flanged steel or welded steel. Step-by-step diagrams show on-the-job installation and photos of typical installations show versatility of application. E. B. Kaiser Co.

102 PVC Pipe and Fittings—Complete data about the Van-Cor line of unplasticized polyvinyl chloride pipe, fittings and valves are given in this 16-pp engineering catalog. Covers both types—chemically-resistant, normal-impact and chemically-resistant, high-impact. Includes physical properties, chemical resistance tables, pipe, fitting and valve dimensions and flow - rate charts, as well as pipe assembly and installation data. Colonial Plastics Mfg. Co.

103 On Plug Valves—Section 5 of Reference Book 39 is a 28-pp catalog showing 100 per cent pipe area, venturi, round port, and diamond port lubricated plug valves in a variety of metals for 150-lb steam working pressure, 200-lb WOG, and ASA 150- and 300-lb classes. Complete with engineering dimensions, this catalog also shows different types of power operators for valves, in addition to complete lines of lever operated, and worm and gear operated valves. Homestead Valve Mfg. Co.

104 Control Valves—Bulletin LB-2 is a well illustrated 12-pp booklet which gives details on construction and operating characteristics of Series LB control valves, available in sizes 1 through 4 in. Describes design and operation features and includes specifications and valve sizing data. Conoflow Corp.

105 Diaphragm Control Valve—Bulletin 980 describes the Type 30 valve which provides accurate pressure reduction and regulation of steam, water, air, brine and most liquids and gases. Includes detailed information on sizes, specifications and dimensions, pressure and temperature ratings, capacities, optional accessories and other data. A. W. Cash Co.

106 Forged Steel Unions—Bulletin U-1-56, 8 pp, presents dimensional and engineering data on a line of forged steel unions for high pressure service. Types of unions described include forged steel unions, tongue and groove flange unions, orifice unions, tab orifice unions, clamp-ring unions, forged stainless steel unions, forged steel unions with bronze-to-steel and stainless-to-steel seats, and lug nut unions. W-S Fittings Div., H. K. Porter Co., Inc.

107 Pipe Thread Seal—Instructions for use of a pipe thread seal-fitting designed for all types of piping installations, including hydraulic power piping installations, water piping, air and vacuum piping, chemical processing and oil refining piping installations are given in this bulletin. A specification sheet is included. Tru-O-Seal Div., Flick-Reedy Corp.

PUMPS, PUMPING

108 High Vacuum Pumps — Recently increased performance ratings of company's rotary mechanical vacuum pumps, as well as other information on vacuum processing, are contained in revised 28-pp Catalog 752. Includes, in addition to specifications for the complete line of pumps, tables of formulas, constants, and conversion factors frequently used in vacuum processing; solutions to problems of pump selection for typical vacuum systems; and information on continuous oil purification and other maintenance procedures for high vacuum pumps. Typical installations are pictured. F. J. Stokes Corp.

109 Reciprocating Pumps—Data Sheet 100 contains complete information on company's 25-hp to 2400-hp direct flow pumps, including the triplex (3 plunger), quintuplex, septuplex, and nonuplex, reciprocating pumps. In addition to design and material specifications, it includes dimension tables and a pump selection chart. The Aldrich Pump Co.

110 Steam Jet Vacuum Pumps — Bulletin 5H3, 8 pp, describes company's 3-, 4-, and 5-stage steam jet vacuum pumps and vacuum boosters, including both condensing and non-condensing types. It covers applications, features of the apparatus, materials of construction, and operation. Sizes and dimensions are given in tabular form along with performance characteristics for 3-stage units. Schutte and Koerting Co.

111 Proportioning Pumps—Bulletin 602, 8 pp, covers details and specifications of company's mechanical and hydraulic drive metering and proportioning pumps, their "meter that pumps," and their chemical metering pump. Capacity and pressure data are tabulated, and materials of construction are described. Hills-McCanna Co.

112 Hydraulic Equipment—Engineering information on hydraulic reservoirs and pumping unit accessories are detailed in this 12-pp catalog. It contains information regarding oil level sight gages, breather caps, filter breather assemblies, and clarifier units. Dimensional data sheets and dimensional diagrams of reservoirs are included. Century Hydraulics, Inc.

MATERIALS HANDLING

114 For Appliance Handling—The Ezy-Up series of magnesium and steel hand trucks, for handling all types and sizes of appliances, is described in Catalog HA-56. Shown in this folder are typical applications of these versatile trucks, moving 650-lb loads up and down stairs with an endless belt stair-climber which is standard equipment on most trucks. Models presented range from a 22-lb general purpose one to the heavy duty 44-lb giant of the line. American Pulley Co.

115 Material Handling Methods—The current winter issue of this company's magazine for fork truck users features an illustrated story on how modern material handling methods saved $160,000 in a single year for a food manufacturer. The publication also offers tips on buying various models of fork trucks, as well as humorous non-related articles for general entertainment. Lewis-Shepard Products, Inc.

116 Trucks, Storage Racks—Catalog 29-1, 20 pp, describes Floormaster trucks and Loadmaster storage racks, containing complete specifications and illustrated with drawings and photos. In addition, catalog points out special commercial and industrial applications for this material handling equipment. Lewis-Shepard Products, Inc.

117 Case Conveyor Chain—Bulletin 56-73 describes a case conveyor chain designed specifically for handling cartons, cases, crates and cans, and made to flex in two directions. Advantages are enumerated and specifications and dimensions tabulated on a chart. Sprockets for the chain are also covered. Chain Belt Co.

118 Pallet Boxes—This 8-pp catalog illustrates and describes a line of standard industrial wirebound pallet boxes for various types of bulk handling jobs. Ways in which pallet box bulk handling can be applied are detailed and specifications included. General Box Co.

MAINTENANCE

119 For Floor Maintenance—This illustrated 4-pp folder describes scrubbing, waxing, polishing, and mopping equipment, as well as waxes, sealers, and cleaners, with recommendations for use and packaging information. New items described include a heavy duty vacuum cleaner (in baked enamel or stainless steel) with 1½ hp, 115 v a-c d-c by-pass motor and tank capacity of 12-gal wet and 1¼-bushels dry. Finnell System, Inc.

120 Sweeping Congested Areas—"Can We Use Mechanized Sweeping Profitably?", 8 pp, reviews advantages and discusses aisle widths, dust control, possible cost savings and other points. Also includes a check list to pre-determine a power sweeper's usefulness, its value for sanitation, safety. G. H. Tennant Co.

CONSTRUCTION

121 Aluminum Structures—This 12-pp illustrated brochure outlines capabilities and facilities of company's aluminum structures. Discusses advantages of aluminum for structural uses, and outlines design concepts pertaining to aluminum extrusions. Structural applications for aluminum extrusions, mechanical properties, and a comparison of aluminum and steel sections are among material presented. Harvey Aluminum Structures.

122 Steel Sash Windows—Twelve-pp Publication 129C describes steel sash pivoted and commercial projected windows, and includes complete design and construction details. Photos and drawings illustrate dimensional and construction features, and a chart indicates comparative tests of joints. Full specifications are also included. Hope's Windows Inc.

123 Flooring Products—Twelve-pp Bulletin CD-156 illustrates and describes a line of flooring products in full color. Included are product descriptions, where to install, and brief architectural specifications on asphalt tile, vinylized tile, vinyl-asbestos tile, and Duraco industrial tile. Azrock Products Division, Uvalde Rock Asphalt Co.

124 Luminous Ceilings — This illustrated bulletin describes six types of luminous ceilings for a variety of installation requirements. Advantages are detailed, and design and construction features illustrated. Specifications are also included. Luminous Ceilings Inc.

INSTRUMENTS, CONTROLS

126 Temperature Controllers—Bulletin MC-139 gives complete specifications on a new series of bulb - and - capillary indicating temperature controllers developed by this company. Tells how controller can be tailored to specific requirements by selecting from the proper "building blocks." Choices include three temperature ranges, three bulb sizes, single or dual control circuits and four basic switch types to meet various electrical loads. Fenwal Inc.

127 Pneumatic Controllers—Bulletin A130, 56 pp, describes the Series 500W pneumatic controller, a high sensitivity, wide control-band controller for temperature, pressure, flow, vacuum and other control applications. Photos and drawings illustrating design and operation features, as well as sections on control principles, and various control modes, are included. Specifications for all models are listed, along with other technical data. The Bristol Co.

128 Static Control Elements—Fundamentals and features of general-purpose static control logic elements are discussed in 8-pp Bulletin GEA 6578. Lists advantages and describes components of company's static control system. Explains how the static control operates without moving parts, and covers the logic function concept, logic functions and conventional control, basic principles of static control, circuit characteristics, monitor lights and amplifiers. General Electric Co.

129 For Process Control—Catalog 505, 16 pp, describes pneumatic instruments for process control, including indicating pilots, transmitters and receiver gages. Specifications are detailed and design features are described and illustrated. Measuring elements for pilots and transmitters are covered, and other descriptive and graphic detail is included. United States Gauge Div., American Machine and Metals, Inc.

130 Plastic-Enclosed Thermostats — Bulletin MC-137 describes two types of thermoswitch units which are encased in plastic for service in highly humid or corrosive environments. Complete specifications are given and applications in plating, refrigeration, greenhouses, and in exposed highly humid atmospheres, corrosive mists, sprays, others described. Fenwal Inc.

131 Improved Water Gage—Bulletin WG-1814, 6 pp, describes company's Color-Port water gage for high pressure boilers (up to 3300 psi). Bulletin gives full details on gage's

BULLETINS

(Begins on page 21)

design and operation, and shows how port-type arrangement and two-color readings give greater visibility and greatly reduced maintenance requirements. Additional features are described, and installation sketches included. Yarnall-Waring Co.

132 Hook Scale — Bulletin M-25 contains photos of company's SU-20 Sensater hook scale in action, and describes chief features of the hydraulic scale which works without friction. Shows applications in weighing operations in several different industries, and contains specification data. Martin-Decker Corp.

133 Rate of Flow Measure—Bulletin 18RG, 12 pp, describes a line of rotameters, versatile variable area type instruments for measurement of fluid rate-of-flow. Discusses rotameter principles and illustrates components common to all such flow measuring instruments. Construction advantages are detailed, as well as application and installation features. Various types of rotameters are described in detail, and sizes and dimensions given in tabular form. Capacity tables and sizing instructions are included. Schutte and Koerting Co.

134 Weighing Systems — Bulletin 561, 12 pp, describes hydraulic weighing systems for tank and bin weighing applications. Construction details are given and a variety of single cell and multi-cell arrangements of bin, tank and hopper weighing systems are described. The A. H. Emery Co.

135 X-Ray For Industry—Bulletin RC-176, 12 pp, contains operating and application data on six types of radiography units for industrial use, including a 60-Kvp portable radiographic-fluoroscopic unit, 160-Kvp dual-port unit, 160-Kvp 360 deg circumferential port unit, 150 and 300 Kv constant potential units, and a 260-Kvp self-contained portable unit. Information is given also on industrial image intensifier and closed-circuit television installations. Photos and characteristics of instruments are included, as well as charts listing data. Instruments Div., North American Philips Co., Inc.

LUBRICATION

136 Power Lubrication—Bulletin 811, 8 pp, describes three types of power lubrication systems—air-operated, vacuum-operated and manually-operated. Typical installations are pictured and photos, drawings and diagrams showing operation and design features are included. Lincoln Engineering Co.

137 High-Temp Lubrication — A compilation of current good practice in high temperature lubrication with colloidal dispersions is given in 6-pp Bulletin 423. Provides brief case histories showing how dag colloidal graphite is used for general lubrication of oven conveyor chains, kiln car wheel bearings, other equipment. Also discusses applications for dag dispersions of molybdenum disulfide. Also covers use of these products in metalworking, metal casting, glass making. Acheson Colloids Co.

138 Improved Greases—Specializing greases are described in two new bulletins. A line of premium greases, the Prestige 40 series, are covered in Bulletin 50. These are for use where water, high temperatures or both, would shorten the life of most greases. Bulletin 49 describes two water-resistant extreme-temperature greases for shock-loaded bearings. Sun Oil Co.

139 Self-Wicking Lubricant—Details on a new development in bearing sleeve lubrication are presented in this 8-pp bulletin on Permawick—a combination of oil and cellulose base fibers chemically blended to form a single, self-wicking liquid lubricant. Method of inserting the material into cavity with the Permajector is also described, and advantages and results of performance tests are given. A sample of the material in a plastic bag is attached to bulletin. Fluidwick Co.

140 Lube Distribution Systems—Bulletin 4A, 12 pp, describes distribution systems for all types of company's automatic lubricators. Following a system from oil reservoir to lubrication point, booklet tells how and where to obtain the best results from any system. Reservoirs, tubing, junctions and meter-units are discussed, as well as analysis of oil distribution and how systems are engineered to provide correct oil film to individual lubrication points. Drawings, photos, and schematic layouts are included. Bijur Lubricating Corp.

ELECTRICAL

141 Synchronous Induction Motor — The Synduction motor, a synchronous induction machine for providing dependable constant speed, simplicity of operation and low first cost in a variety of industrial applications requiring 40 hp and below, is described in Bulletin 51B8440A. Features are described and application information and specifications are included. Allis-Chalmers Mfg. Co.

142 Shaded-Pole Motors — Bulletin GEA-6134A, 12 pp, describes shaded-pole motors for fan and blower applications in ratings 1.5 w through ¼ hp. Contains application, rating, and dimension data on 5½ in. (39-frame) motor rated 1/12 through 1/4 hp, 5-in. (21-frame) motor rated 25 mph through 1/12 hp, 4-in. (11-frame) motor rated 15 mph through 35 mph, and 3½ in. (51-frame) motor rated 1.5 through 16 w. Shows product features and lists accessories available. General Electric Co.

143 Explosion-Proof Motor—Latest design features of company's explosion-proof motors in NEMA rerated ratings of 1/2 to 30 hp (Type GZZ) and in non-rerated ratings of 1/2 to 100 hp (Type APZZ) are described in Bulletin 51B7286G. In addition to cutaway views of the motor, bulletin includes tables of ratings and dimensions as well as a horsepower frame chart. Allis-Chalmers Mfg. Co.

144 Protected Motors — This company's Tri/Clad 55 motors, 1 to 5 hp., dripproof and enclosed, are described in 12-pp Bulletin GEA-5980. Illustrates production testing techniques and construction features of the line, and discusses servicing and installation advantages. General Electric Co.

145 Fan Motors—Bulletin GEA-6533, 8 pp, illustrates advanced construction features of company's Type KCP, permanent-split capacitor fan motors for room air conditioners, 55 mhp to 1/6 hp. It includes a "Design Engineer's Corner" which points out motor's speed versatility, low temperature rise, high power factor, other advantages. General Electric Co.

146 Control Transformers—Bulletin GED-2767A, 32-pp, gives voltage ratings, frequency, frame sizes, weight, application, price, and specification data on autotransformers, control panel and machine-tool transformers. Contains accessory information, wiring diagrams, and voltage regulation curves for use in selecting the proper transformer for a given application. Special application section gives similar data on a line of refrigerator transformers as well as normal, high-reactance and encapsulated transformers. General Electric Co.

147 Circuit Breakers—Bulletin 3411, 20 pp, covering general purpose circuit breakers of the hydraulic-magnetic type describes in detail hydraulic-magnetic principle, design, operation, and application of this circuit breaker. Schematic diagrams, time-delay curves, and other engineering information are included. Data on basic design considerations, voltage drop curves, interrupting capacities and similar information is also covered in tabular or graphic form. Wiring diagrams illustrate special circuit forms. Heinemann Electric Co.

148 High-Speed Breakers—Bulletin 3004-A, 6 pp, contains descriptive and technical information about the FB line of high speed, current limiting d-c circuit breakers. Principal applications for generators, motors, anode protection and as feeder breakers are listed, and wiring diagrams and outline drawings are included. Operation is shown schematically. I-T-E Circuit Breaker Co.

149 Air Interrupter Switch—Bulletin 100, 8 pp, provides full details on company's high voltage air interrupter switch. The comprehensive description includes case and cutaway photos, multiple position illustrations, dimensional drawings, typical specifications and examples of built-in installations. Cutaway photos illustrate three front-operated types available and photos showing installation procedure are included. Continental Electric Equipment Co.

150 Mercury Plunger Relay — Catalog 154 is a file folder containing complete information on mercury plunger relays and related products, including load ratings and contact data, coil characteristics, diagrams and illustrations. Among literature included in file is a pamphlet telling how relays operate, and giving contact and coil ratings and operating characteristics, comparison with standard contactors, and applications for standard and special-purpose types. Ebert Electronics Corp.

151 Static Switching Systems — Bulletin GEA-6364, 8 pp, describes operation of a static switching system and lists its advantages as reduced downtime, easy maintenance, greater reliability, greater flexibility, reduced inspection and replacement, and minimized atmospheric problems. In discussing areas for applying static switching systems, bulletin cites operations in which dependability, a high degree of automation, frequent operation, or maintenance under severe atmospheric conditions is an important factor and recommends this contactless control for such use. General Electric Co.

152 Terminal Blocks — Condensed Catalog 556, 8 pp, features company's entire line of terminal blocks and terminal block kits. Technical description, specifications and current prices are included, accompanied by a selector chart designed to pinpoint best block for each application. Curtis Development & Mfg. Co.

153 Cathodic Protection Cable—Two kinds of cathodic protection cables are described in this informative bulletin. Special advantages of each are listed, and applications and specifications are given. General Cable Corp.

On pages 195-196 are two postage-free Reader Service Cards provided for your convenience in ordering these bulletins. You may also use the cards to order any literature mentioned in ads.

154 Replacement Capacitors — This company's 1957 Replacement Capacitor Catalog 200D-3, 44 pp, covers electrolytic, paper tubular, industrial, mica, ceramic, filter and motor start capacitors. Catalog is sectionalized and thumb-indexed for quick reference. Complete engineering data on types of capacitors is presented in tabulated form, and photos and drawings are used to illustrate features of operation and design. Cornell-Dubilier Electric Corp.

155 Porcelain Insulators — Catalog 56, 66 pp, details general engineering data for purified porcelain insulators and includes the latest EEI and NEMA standards, as well as a presentation of company facilities for manufacture of porcelain to customer specifications. Covered in the catalog are pintypes, guy strains, spools, line posts, suspensions, switch and bus insulators, malleable, forged steel and aluminum hardware and a complete line of indoor switch and bus supports. Victor Insulator Div., I.T.E. Circuit Breaker Co., Inc.

MECHANICAL POWER TRANSMISSION

156 On V-Belt Drives — This 16-pp engineering manual is organized to provide quickly the facts and figures on V-belt drives. It is divided into three general sections. The first is devoted to drive service factors, instructions on how to select a stock drive, and complete drive tables for A, B, C, D and E section V-belts. The drive design section lists drive service factors, and provides designing instructions and data, as well as complete tables of horsepower ratings. A general information section is included. Maurey Mfg. Corp.

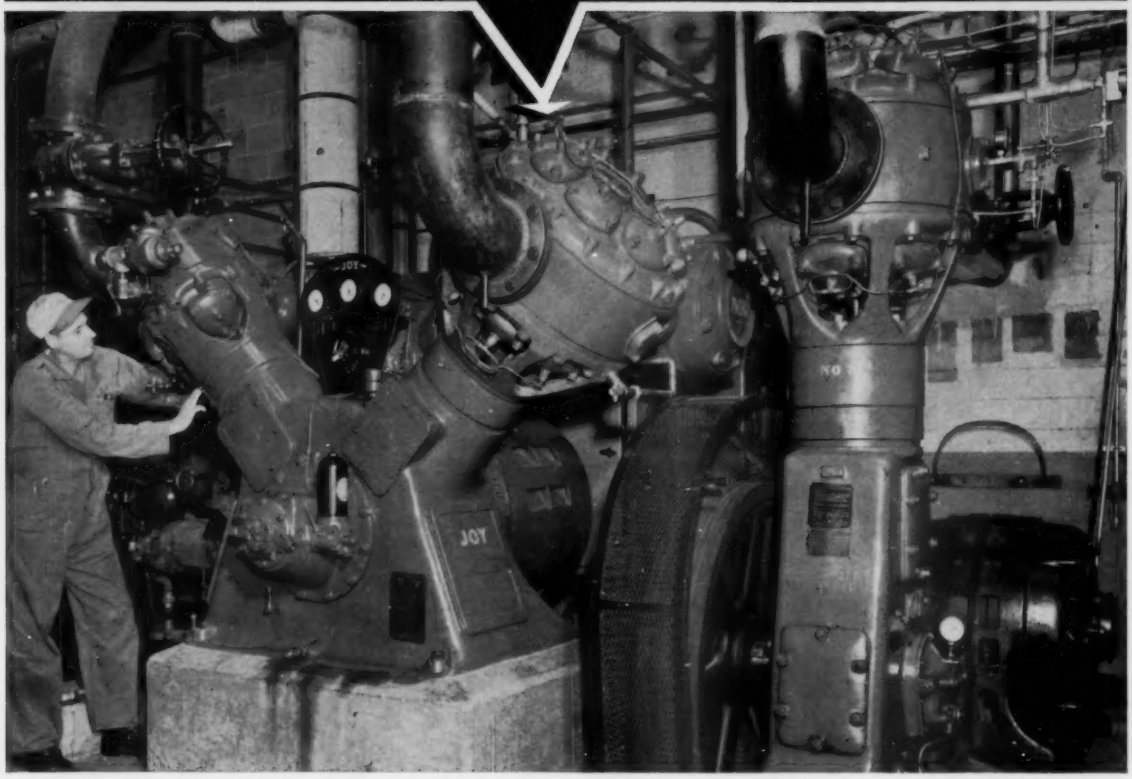
157 Grommet V-Belts — Construction features of the "Texrope" grommet V-belt are described in Bulletin 20B6497C. Advantages are detailed and design and construction features are illustrated with cutaway drawings and photos. Allis-Chalmers Mfg. Co.

158 Flexible Chain Couplings — Catalog C45-56, 16 pp, contains specifications, dimensions, ratings and application on series DSC, series SA silent chain couplings and series DRC roller chain couplings. Pertinent information is also tabulated on stamped steel covers, and other covers. Morse Chain Co.

(More Bulletins on page 197)

They Needed More Oil-Free Compressed Air But Had Limited Space

A Third Joy Unit Solved it!



A West Coast Company needed more oil-free compressed air . . . in a hurry! However, there just wasn't any space in the boiler room for additional machines. They had been operating two Joy WG-9 OL vertical compressors (the machine at right in the photo). These non-lubricated compressors had run continously . . . 24 hours a day . . . for *17,000 hours with no down time.*

So they again called Joy in on the problem. The solution: One WG-9 OL with 75 hp was taken out and replaced with a Joy WN-112 E-OL rated at 150 hp. This 974 cfm machine supplies plenty of air for the new equipment, yet is compact enough to fit into the small space available.

If you need oil-free air take advantage of Joy's more than 25 years of experience with non-lubricated compressors. Write ***Joy Manufacturing Company, Oliver Building, Pittsburgh 22, Pa.*** In Canada: *Joy Manufacturing Co. (Canada) Limited, Gal, Ont.*

Write for FREE Bulletin 130-15

Consult a Joy Engineer

For Air and Gas Compressors, Vacuum Pumps and Boosters, Conveyors, Fans, Electrical Connectors.

WBW 16307-130

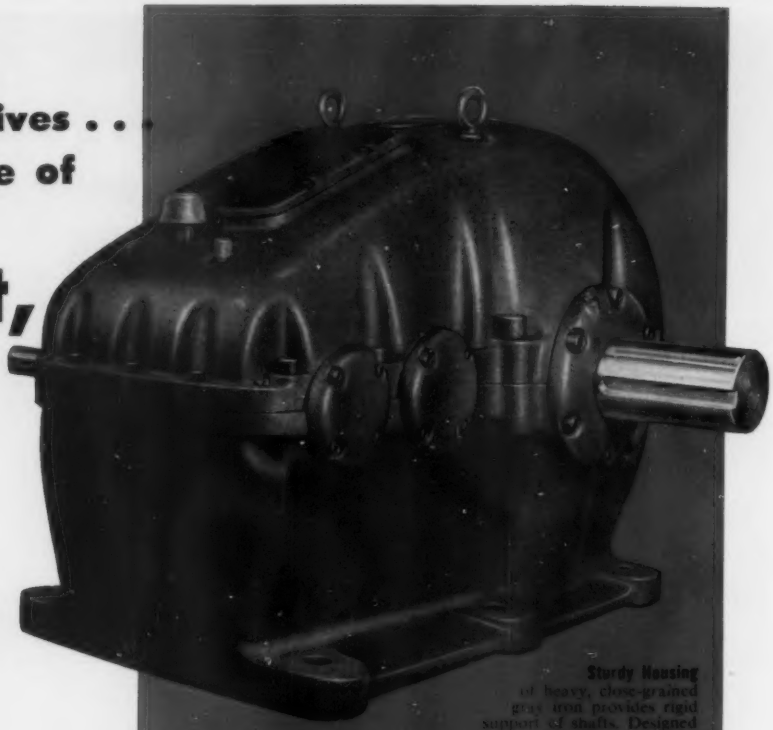
JOY

SPECIALISTS IN THE COMPRESSION AND MOVEMENT OF AIR AND GASES SINCE 1845

For more facts circle 516 on Reply Card

In heavy-duty drives . . . demand assurance of

permanent, accurate shaft alignment



Sturdy Housing of heavy, close-grained gray iron provides rigid support of shafts. Designed so that all parts can be removed without disturbing base or draining oil.

It's yours...with these other "plus" performance features—in LINK-BELT Parallel Shaft Drives

Under the shocks and overloads that are often imposed upon parallel shaft gear drives, rugged housing construction is compulsory if shaft alignment is to be maintained. That's why Link-Belt adds special reinforcement at points of greatest stress . . . has developed this design expressly for endurance in heavy-duty service.

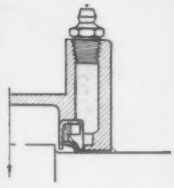
Write for Book 2619 on this broad line with ratios to more than 300:1. Or get first-hand facts from your nearest Link-Belt office or authorized stock-carrying distributor.

14.249

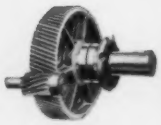
LINK-BELT

ENCLOSED DRIVES

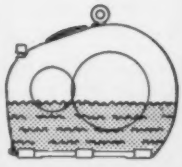
Ball and Roller Bearings are of ample size and capacity to withstand shock and overloading.



Grease-Lubricated Seals on all input and output shafts prevent entrance of dirt, water.



Precision Gears and Shafts are arranged to provide high reduction ratios in small space.



Automatic Splash Lubrication reliably supplies oil to all gears and bearings.

LINK-BELT COMPANY: Executive Offices, Prudential Plaza, Chicago 1. To Serve Industry There Are Link-Belt Plants, Sales Offices, Stock Carrying Factory Branch Stores and Distributors in All Principal Cities. Export Office: New York 7; Canada, Scarboro (Toronto 13); Australia, Marrickville, N.S.W.; South Africa, Springs. Representatives Throughout the World.

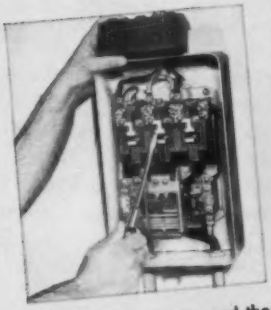
For more facts circle 517 on Reply Card

For more facts circle 518 on Reply Card ⟶

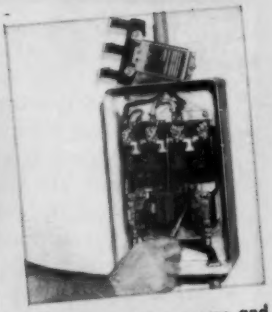
Here's Why We Specify
SQUARE D Starters
on the Machinery We Buy

PERFORMANCE, EASY INSPECTION AND MAINTENANCE

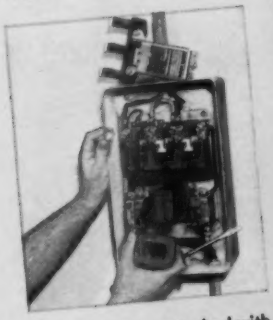
Sure, we like Square D performance because it keeps our "down time" at a minimum. BUT—everybody knows that even the best starter needs periodic inspection and preventive maintenance. We like the way Square D makes it easy to handle those routine jobs.



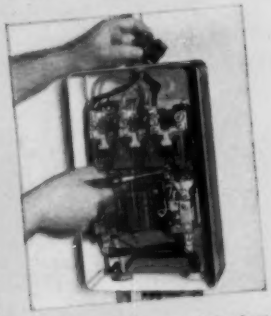
1 Loosen two screws and the arc chamber cover comes off. Every contact surface can be inspected at a glance.



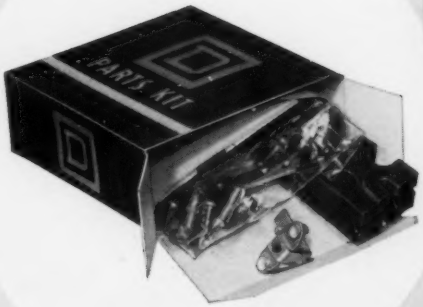
2 Remove four screws and entire movable assembly can be lifted off. Disconnect two wires and slip off magnet coil.



3 Contacts are attached with separate screws—they can be removed and replaced without disturbing any wiring. A screwdriver is the only tool needed.



4 Sizes 0 through 4 starters have these separate mounting electrical interlocks for easier installation. Contact block is attached from front of panel with two screws.



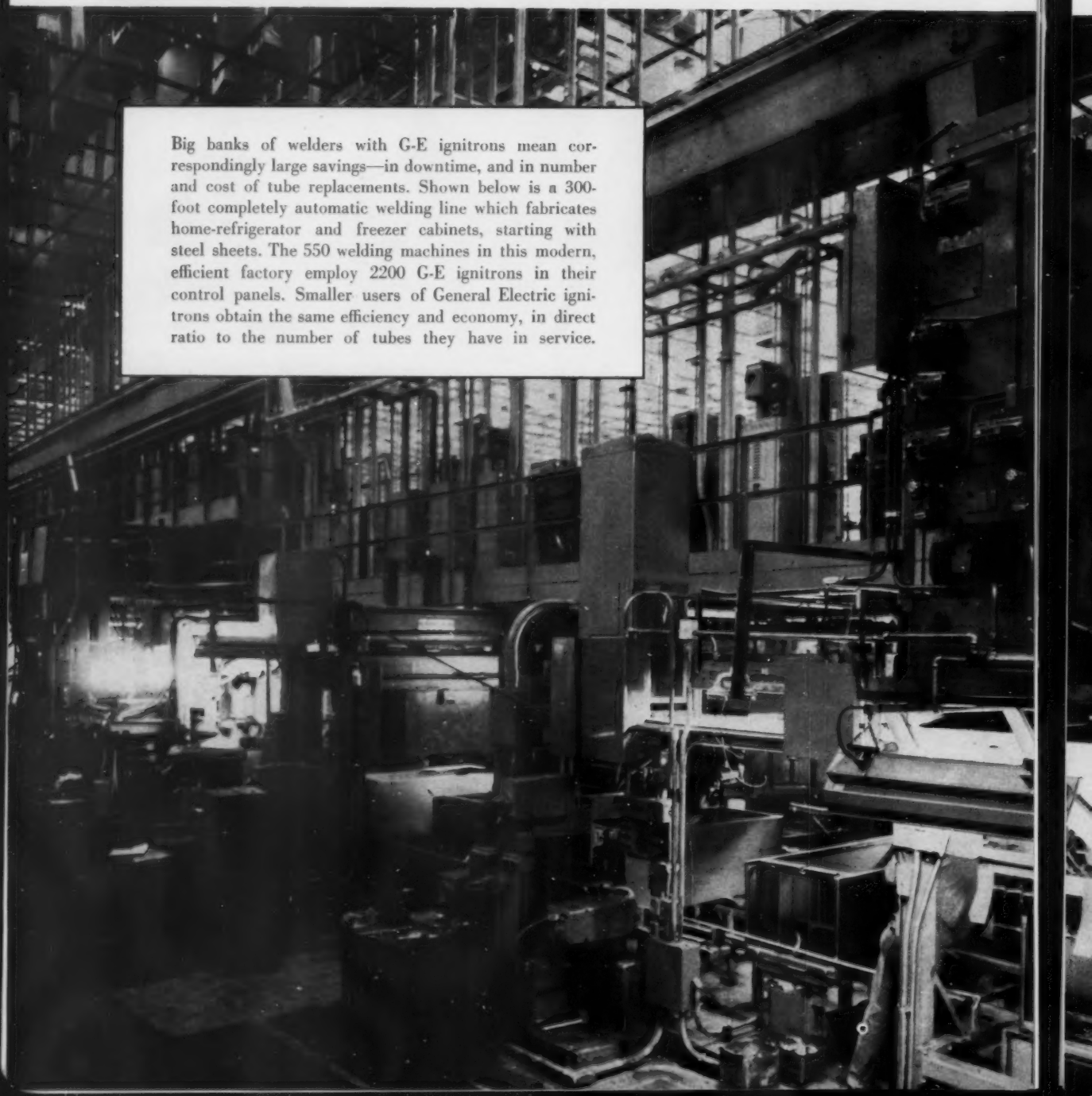
OFF-THE-SHELF PARTS KITS

They make normal maintenance and modifications easier than ever. Packaged parts include interlocks, contacts, coils, overload relays, pushbuttons and selector switches. They're easy to buy, easy to identify, and faster to install.

NOW...EC&M PRODUCTS ARE A PART OF THE SQUARE D LINE!

SQUARE D COMPANY

YOUR SAVINGS MATCH THE SIZE WITH GENERAL ELECTRIC'S NEW



Big banks of welders with G-E ignitrons mean correspondingly large savings—in downtime, and in number and cost of tube replacements. Shown below is a 300-foot completely automatic welding line which fabricates home-refrigerator and freezer cabinets, starting with steel sheets. The 550 welding machines in this modern, efficient factory employ 2200 G-E ignitrons in their control panels. Smaller users of General Electric ignitrons obtain the same efficiency and economy, in direct ratio to the number of tubes they have in service.

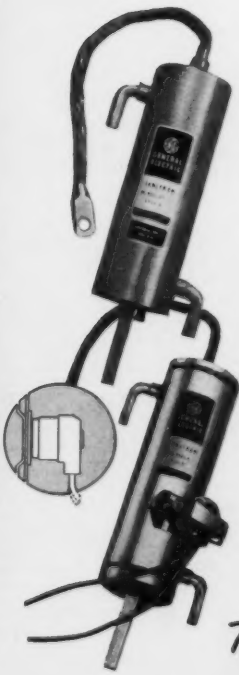
OF YOUR WELDER INSTALLATION AND REMANUFACTURED IGNITRONS!

CUT downtime and tube replacement costs! Select your welding ignitron replacements from General Electric's complete line of dependable, long-life tubes! Four different types—each designed to answer a specific welding need—can be obtained from one convenient source, your local General Electric Tube Distributor.

Every G-E ignitron means dollars saved, no matter what the size of your plant. Reliability, trouble-free operation—these qualities slash expensive work stoppages . . . help keep your production lines moving.

Also . . . save 28% on tube replacement costs! Turn in your inoperative G-E ignitrons—if in exchangeable condition—for remanufactured tubes on a one-for-one basis. Get rebuilt G-E tubes with new-tube life and dependability . . . backed by a new-tube warranty. Yet pay up to $63 *less* for each unit you exchange.

To estimate the actual dollar savings G-E ignitrons can bring *you* this coming year, see your local G-E Tube Distributor! *Electronic Components Division, General Electric Company, Schenectady 5, New York.*

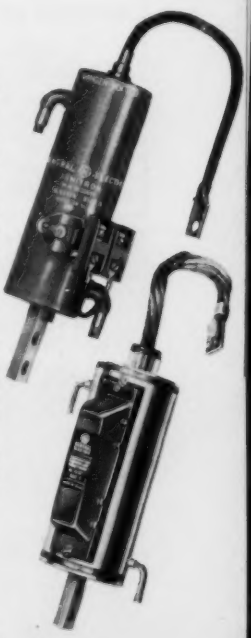


G-E Remanufactured Ignitrons get complete new cathode assembly. They give new-tube performance; are backed by standard G-E warranty. Cost $17.90 to $63 less than new ignitrons . . . almost a one-third saving.

General Electric Plastic-coated Convertible Ignitron has a safety plastic covering to shield workers from hazardous voltages. Plastic is red for warning. "Danger . . . voltage" is stamped on. Tube condensation minimized.

G-E Convertible Ignitron has built-in thermal contact bracket to carry a thermostat, for over-temperature protection or water regulation. Either flying-lead or terminal-block thermostat supplied.

G-E Temperature-controlled Ignitron is the finest tube of its kind. Over-temperature control . . . water regulation . . . both are built in. The tube is pre-adjusted at the factory for lifelong efficiency of operation.



Progress Is Our Most Important Product

GENERAL ELECTRIC

161-1C8

For more facts circle 519 on Reply Card

"THIS LUBRICANT SAVED US $2,098·16 IN SEVEN MONTHS"

—says THE BROWN COMPANY
Quality Paper Makers of Berlin, N. H.

"During a seven-month period before using LUBRIPLATE No. 130-AA in the bearing of our Kraft Mill Lime Kiln, we used a conventional oil at a cost of $2,134.00. In the seven months that followed, we used LUBRIPLATE No. 130-AA for initial filling and replacement at the cost of $35.84."

REGARDLESS OF THE SIZE AND TYPE OF YOUR MACHINERY, LUBRIPLATE LUBRICANTS WILL IMPROVE ITS OPERATION AND REDUCE MAINTENANCE

LUBRIPLATE LUBRICATION MAKES CARS AND TRUCKS RUN BETTER AND LAST LONGER

LUBRIPLATE H.D.S. MOTOR OIL . . . THE OIL THAT NEEDS NO ADDITIVES

For nearest LUBRIPLATE distributor see Classified Telephone Directory. Send for free "LUBRIPLATE DATA BOOK" . . . a valuable treatise on lubrication. Write LUBRIPLATE DIVISION, Fiske Brothers Refining Co., Newark 5, N. J. or Toledo 5, Ohio.

For more facts circle 520 on Reply Card

BACKTALK about our past issues

Edited by Marjorie E. Weissman

Scrap Handling

PLANT ENGINEERING:

"An article appearing on page 100 in the September issue of PLANT ENGINEERING, titled 'Conveyor Transfers and Stores Scrap,' created some interest in our plant, since the same idea has been considered to improve our own scrap handling. However, we are interested in knowing how, in this instance, the unloading of the storage bin is accomplished." *R. C. Raffaelle Manager, Material Storage and Transportation, The Jeffrey Manufacturing Co., Columbus, Ohio.*

▶ Not mentioned in our story was the fact that the storage bin narrows down to a conical section, beneath which a vehicle can be positioned. The discharge spout on the storage bin has chain and gear operated steel roller gates and the operator need only push a button to empty scrap from the bin into the vehicle. Twenty-five tons of scrap can be loaded in less than one hour.—*Editors.*

Navy Program

PLANT ENGINEERING:

"I read the article 'Control Maintenance and You Cut Costs' in the December, 1955 issue of PLANT ENGINEERING. I am particularly interested in the new Navy program which has the three basic objectives mentioned in the introduction:

"1. To bring the facilities of the Naval Shore Establishment up to a proper level of maintenance.

"2. To increase the productivity of the maintenance forces

"3. To achieve actual savings in maintenance and utilities services

"I would like to know how standards are established and the procedures for job planning, scheduling and performance evaluation. Of particular interest to me is the planning and estimating division, in which time standards are being set up, for at the present time, our company is trying to establish a similar system.

"I am in the maintenance department at our company and would like to know more about Public Works Department of the Navy. Would it be possible to spend my two weeks' annual CB Reservist training period becoming better acquainted with the program now being established by the Navy? If this is possible, I shall write a letter going through the proper chain of commands, requesting it. If there is no chance of this, to whom should I write for further information?" *Harold J. C. Fricke, Maintenance Dept. Bell & Howell Co., Chicago, Ill.*

▶ A copy of Mr. Fricke's letter was sent to Harold M. Sylvester, Special Assistant for Maintenance, Properties and Installations, Office of the Assistant Secretary of Defense, Washington, D. C. Following is Mr. Sylvester's reply to Mr. Fricke:

"Your interest in the Maintenance Program which is now being carried out by BuDocks is appreciated.

"The matters which you presented in your letter have been forwarded to the Bureau of Yards and Docks and the officials of that Bureau will ascertain what arrangements are feasible for furnishing you with further information in regard to the Controlled Maintenance Program."

How To Obtain Tear Sheets

PLANT ENGINEERING:

"Please inform me of the procedure and cost of obtaining a copy of the article entitled 'Pumps—Where To Use Them and How To Use Them,' which appeared

in the June 1952 issue of PLANT ENGINEERING. *James P. Abbott, Administrative Assistant, E. B. Wiggins Oil Tool Co., Inc., Los Angeles, Calif.*

▶ Just ask! We keep a fairly complete file of back copies of PLANT ENGINEERING and usually we are able to supply the material requested by our readers. There is no charge for this material; it is sent with the compliments of the editorial department.

If our file of a particular article should be depleted, we can have photostats made from the bound copies of the magazine, for which, of course, we charge the price of the photostat.—*Editors.*

Detective Work on Reference

PLANT ENGINEERING:

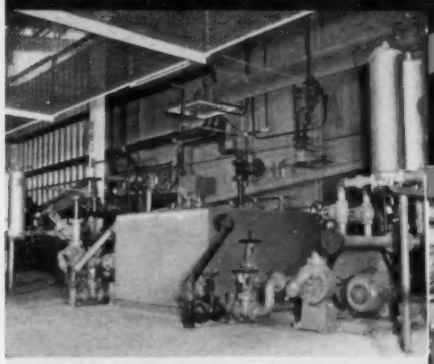
"We have been given reference to a PLANT ENGINEERING paper published in January, 1953. Please advise if a reprint is available or how it may be obtained.

"The paper is authored by J. E. Missley, PLANT ENGINEERING number 54 of January, 1953." *R. H. Walpole, Jr., General Manager, Pneumatics, Inc., San Francisco, Calif.*

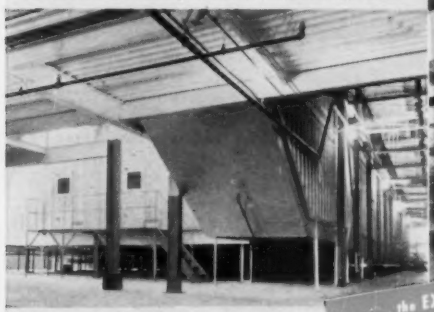
▶ After a little detective work we found the article Mr. Walpole wanted. It was

COMPLETE *Finishing* SYSTEMS

. . . for ENAMELS • LACQUER • PAINT • VARNISH

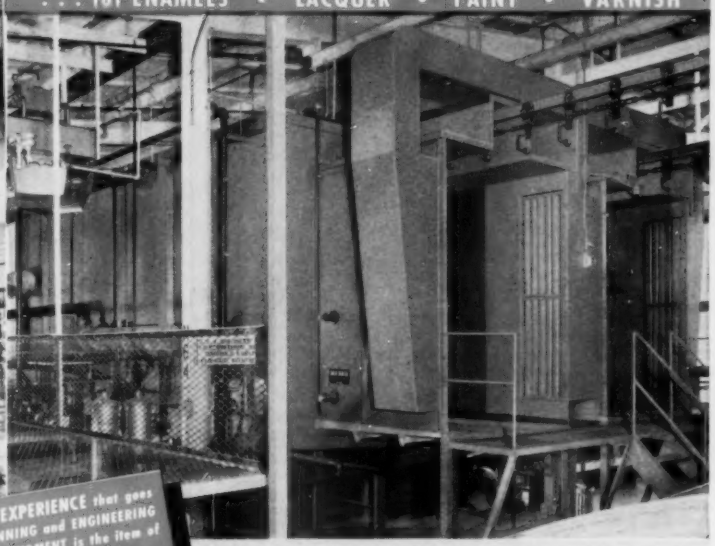


Combined Paint and Solvent Reservoirs, Recirculating Pumps and Temperature and Viscosity Controls on one side of Flow Coater.

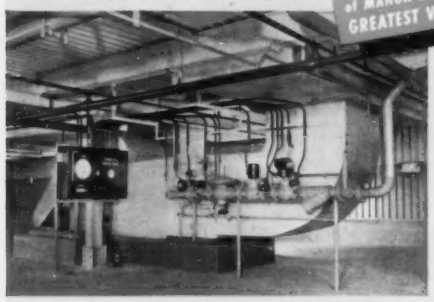


View of Ventilated Drip Enclosure and inclined Tunnel to the Overhead Finish Baking Oven.

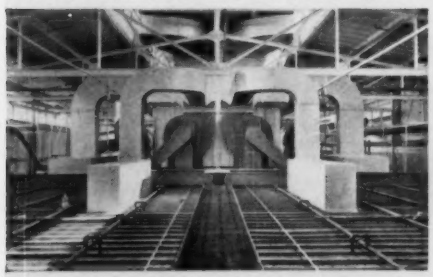
. . . the EXPERIENCE that goes into the PLANNING and ENGINEERING of MAHON EQUIPMENT is the item of GREATEST VALUE to YOU!



Mahon Dual Flow-Coating Machine with two separate and independently controlled Flow-Coating Units serving two parallel conveyor lines.



One of the Gas-Fired Heating Units with Automatic Temperature Control Equipment below the Overhead Finish Baking Oven.



General view of Mahon Air Supply and Exhaust Equipment which provide Filtered Air and Ventilation for the entire system.

Dual Flow-Coating System CUTS Paint VOLUME, MANPOWER Requirements, and Operating COSTS!

The new Flow-Coating System illustrated here has proved a tremendous saving in painting automobile hoods, fenders, fans and miscellaneous parts. The system has two parallel conveyor lines carrying parts through a dual Flow-Coating Machine—either side of which may be operated independently. Each section of the Flow-Coating Machine is served by a 450-gallon paint reservoir and a 450-gallon solvent reservoir and are fitted with automatic equipment to maintain constant paint viscosity and temperature. Other equipment in this system includes ventilated drip enclosures with sumps, scavenger pumps, and facilities for solvent flush-down, a finish baking oven and an air supply and exhaust system. This system now paints, on one line, all parts previously painted in two dip-coating systems which required an operating volume of 16,000 gallons of paint. One man operates and maintains the new Mahon System, where twelve men were required to operate and maintain the old equipment. The savings in material, labor and operating costs are obvious. If you have a finishing problem, it will pay you to discuss methods, equipment requirements and possible production layouts with Mahon engineers . . . you will find them better qualified to advise you, and better qualified to do the all-important planning, engineering and coordinating of equipment . . . and, if you care to investigate, you will also find that Mahon equipment will serve you better over a longer period of time. See Sweet's Plant Engineering File for information, or write for Catalog A-657.

THE R. C. MAHON COMPANY • Detroit 34, Michigan

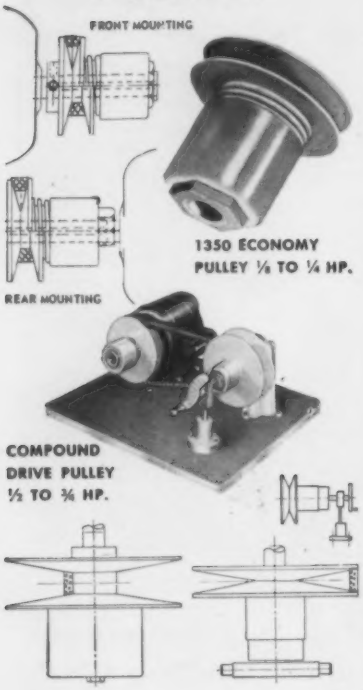
SALES-ENGINEERING OFFICES in DETROIT, NEW YORK and CHICAGO

Engineers and Manufacturers of Complete Finishing Systems—including Metal Cleaning, Pickling and Rust Proofing Equipment, Hydro-Filter Spray Booths, Dip and Flow Coaters, Filtered Air Supply Systems, Drying and Baking Ovens, Cooling Tunnels, Heat Treating and Quenching Equipment for Aluminum and Magnesium, and other Units of Special Production Equipment.

MAHON

For more facts circle 521 on Reply Card

Lovejoy
Fractional Horsepower
VARIABLE SPEED
PULLEYS



Economical—
low in initial cost . . . easily installed on old or new equipment.

Minimum Maintenance—
simple construction assures trouble-free operation . . . lifetime lubricated with oil-impregnated bronze bushings.

Constant Belt Alignment—
inner and outer pulley sheaves open equally to provide smooth, infinitely variable speed ratios to 8 to 1.

No Slippage—
Sure grip of belt sides delivers full traction under all load conditions...result is greater horsepower carry capacity.

Get the new 12-page Lovejoy catalog! Write today.

LOVEJOY FLEXIBLE COUPLING CO.
4888 W. Lake St., Chicago 44, Ill.
For more facts circle 522 on Reply Card

BACKTALK

an item on the use of a funnel for improving granular flow, written by J. E. Nissley, and published in the June, 1953 issue of PLANT ENGINEERING.—*Editors.*

Testing by Ultrasonics

PLANT ENGINEERING:

"After consulting your annual index, I found an article on non-destructive testing of pipe, on page 54 of the June, 1955 issue.

"Can you please tell me the name of the manufacturer of the ultrasonic thickness-testing machine? I have a similar application and I would appreciate more information." *Harry Steckler, P. E., Mechanical Engineer, Bureau of Sewage Disposal Design, Department of Public Works, New York, N. Y.*

▶ In November, 1954, PLANT ENGINEERING published an article dealing with the subject of ultrasonic inspection in considerably more detail than the item noted by Mr. Steckler. The earlier article was concerned with the use of the Reflectoscope, made by Sperry Products, Inc., located at 1000 Shelter Rock Rd., Danbury, Conn.—*Editors.*

Epoxy-Resins May Offer Help For Corrosion Troubles

▶ In October, 1956 issue of PLANT ENGINEERING we published an article titled "Epoxy Corrosion Preventers," by Mr. A. G. Sternberg, Technical Director of the Steelcote Manufacturing Co., St. Louis, Mo. We received the following letter, addressed to Mr. Sternberg in care of PLANT ENGINEERING.

"We have read with considerable interest your article 'Epoxy Corrosion Preventers' in the October PLANT ENGINEERING.

"In the manufacture of aluminum entrances we finish and anodize extrusions purchased from various extruders. As our anodizing process is really the heart of our operations, maintenance of our tanks is of prime importance. We have a corrosion problem as a result of the sulfuric acid and caustic solutions dripping on the outer surfaces of the tanks when we transfer loads.

"We would appreciate any information you can give us on the epoxy corrosion preventers." *E. L. McNiff, Works Mgr., American Art Metals Co., Atlanta, Ga.*

The following is the substance of Mr. Sternberg's reply.

Without question, the proper way to prepare the tanks for this or any finishing system is to carefully sandblast the surface and, if you have a primer on the outside of the surface, this should be very carefully removed.

If sandblasting is impractical, very good results are obtained by carefully wire-brushing, preferably power wire-brushing or power disk-sanding, to as clean and shiny a metal surface as it is practical to obtain. The cleaner the surface, the better the over-all durability. Over this we recommend two coats of an epoxy-type primer to give cathodic protection to the metal and to give a high degree of adhesion. This should, in your case, be protected by multiple coats of a non-reactive material on the surface.

▶ For readers wishing more information on dealing with corrosion problems similar to that of Mr. McNiff, we would like to point out that Mr. Sternberg's company, as well as a number of others, would be pleased to answer queries from readers of PLANT ENGINEERING.—*Editors.*

Construction Briefs Here Again

PLANT ENGINEERING:

"In July of 1953, your magazine started a series of articles known as Construction Briefs. The original articles were prepared by Byron A. Engelbach, plant engineer. Our office files indicate that we have copies of July, September and

November of 1953, then we skip until May, 1954. If possible, can these gaps be filled at this time? Also, if the series is still in order is it possible to purchase a complete set?" *G. Merrill Thomas, Plant Buyer, Dragon Cement Co., Inc., Thomaston, Maine.*

▶ The complete set of Construction Briefs has been published in three booklets, all of which are again available at 50 cents apiece.—*Editors.*

Reprinting Article for Internal Use

PLANT ENGINEERING:

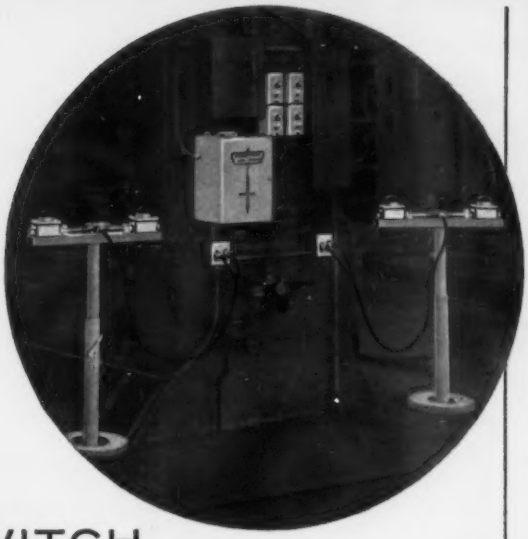
"Your permission is requested to reproduce one copy of the following material for use by interested personnel in our organization in the course of their work: 'Planning the Radioactivity Laboratory,' published in PLANT ENGINEERING, page 83, Vol. 10, No. 8; and 'Materials Handling Modernizes,' published in PLANT ENGINEERING, page 87, Vol. 10, No. 8." *Elsie A. Noey, Librarian, ANP Department Library, General Electric Co., Cincinnati, Ohio.*

▶ Readers are welcome to reproduce any article from PLANT ENGINEERING for use within their own organization only, without requesting permission.—*Editors.*

MICRO SWITCH trip controls

THEIR USE-IS A PRINCIPLE OF GOOD PRODUCTION

Multi-station control switches mounted on pedestals.



MICRO SWITCH TRIP CONTROLS for SAFETY and PRODUCTION

WIDE VARIETY OF PRESS CONTROL METHODS AVAILABLE

1. One operator—two hands.
2. One operator—two hands or one foot.
3. One operator—two hands or either hand or one foot.
4. Two operators—one to four hands, any combination, or one foot.
5. Three operators—one to six hands, any combination, or one foot.
6. More than six hands, any combination, or one foot.

INCREASED PRODUCTION

- Instant electrical response
- Feather-touch operation
- Easy control changes
- Decreased operator fatigue

INCREASED SAFETY

- Two hand operation
- Cannot be "cheated"
- Inoperable if any component fails
- Interlock prevents power stroke while changing dies

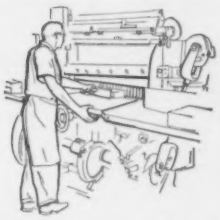
MICRO SWITCH Trip Controls have wide range of uses

These controls offer a choice of desirable single-stroke control for positive mechanical clutch machines and automatic cycling control for friction clutches and hydraulic and pneumatic equipment.

FOR SMALL PRESSES

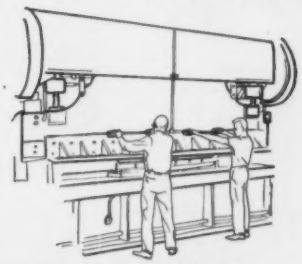
Provides fast, safe, effortless operation of small two-hand presses, riveting machines, etc.

FOR PAPER CUTTERS



Complete protection is afforded operator in cutting or trimming either flat stock or labels.

FOR USE ON LARGE PRESSES



Makes operation of large presses and press brakes safe and less tiring. Any number of operator stations may be "wired into" the control circuit.

SEND FOR CATALOG 65 TODAY

Gives complete description of all controls and clutch actuating equipment.

Let us send you complete information on MICRO SWITCH *Trip Control and the name of the distributor nearest you.*

MICRO SWITCH

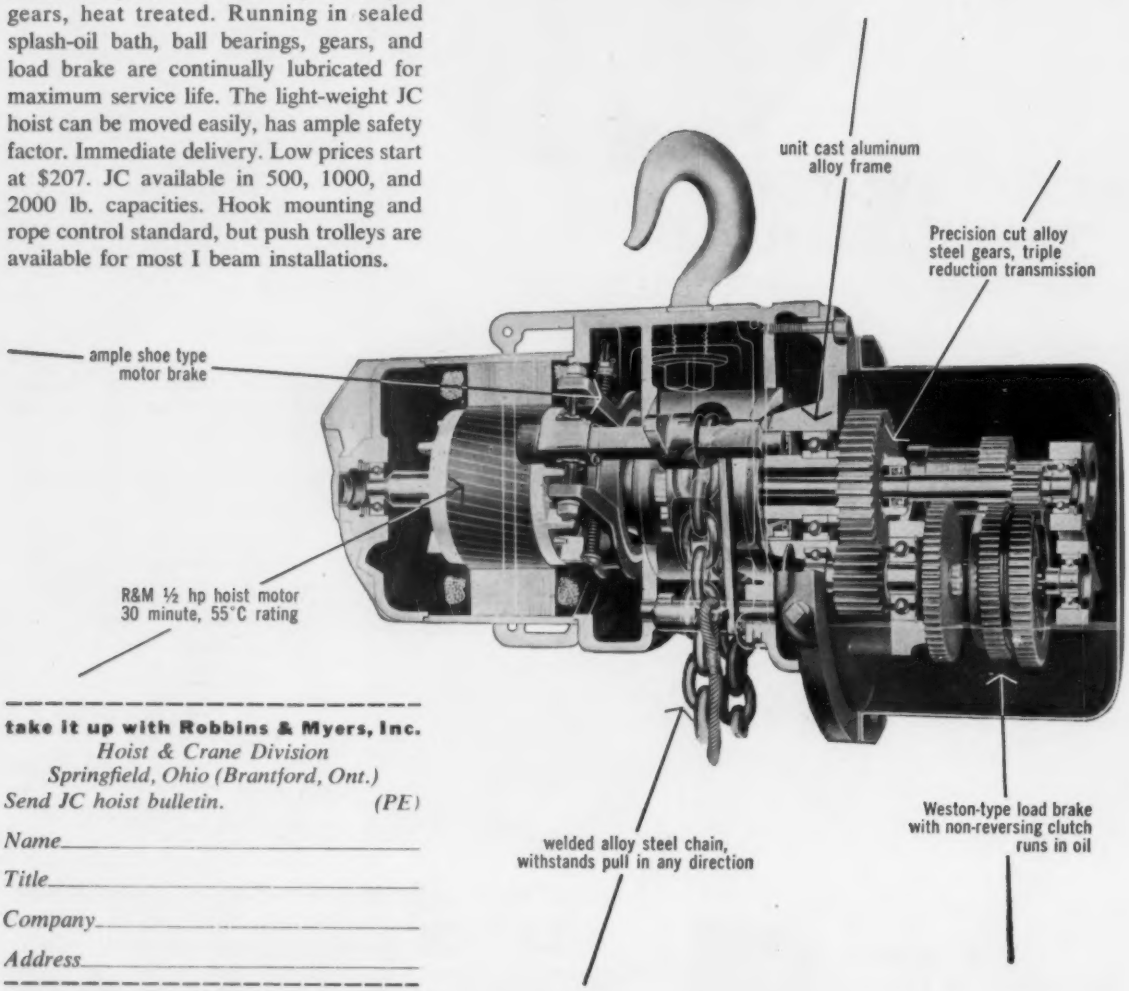
A DIVISION OF MINNEAPOLIS-HONEYWELL REGULATOR COMPANY

In Canada, Leaside, Toronto 17, Ontario • FREEPORT, ILLINOIS

For more facts circle 523 on Reply Card

R&M JC chain hoists are ahead of competition in quality—right with it in price. See for yourself why more value for the same money is yours in the JC. The ½ hp R&M heavy duty motor is equipped with an oversize shoe brake to assure quick stops, accurate load spotting, longer life. Separate load brake is Weston-type, with non-reversing clutch to prevent drift. Gearing—triple reduction precision cut alloy steel spur gears, heat treated. Running in sealed splash-oil bath, ball bearings, gears, and load brake are continually lubricated for maximum service life. The light-weight JC hoist can be moved easily, has ample safety factor. Immediate delivery. Low prices start at $207. JC available in 500, 1000, and 2000 lb. capacities. Hook mounting and rope control standard, but push trolleys are available for most I beam installations.

quality to spare


unit cast aluminum alloy frame
Precision cut alloy steel gears, triple reduction transmission
ample shoe type motor brake
R&M ½ hp hoist motor 30 minute, 55°C rating
welded alloy steel chain, withstands pull in any direction
Weston-type load brake with non-reversing clutch runs in oil

take it up with Robbins & Myers, Inc.
Hoist & Crane Division
Springfield, Ohio (Brantford, Ont.)
Send JC hoist bulletin. *(PE)*

*Name*_____

*Title*_____

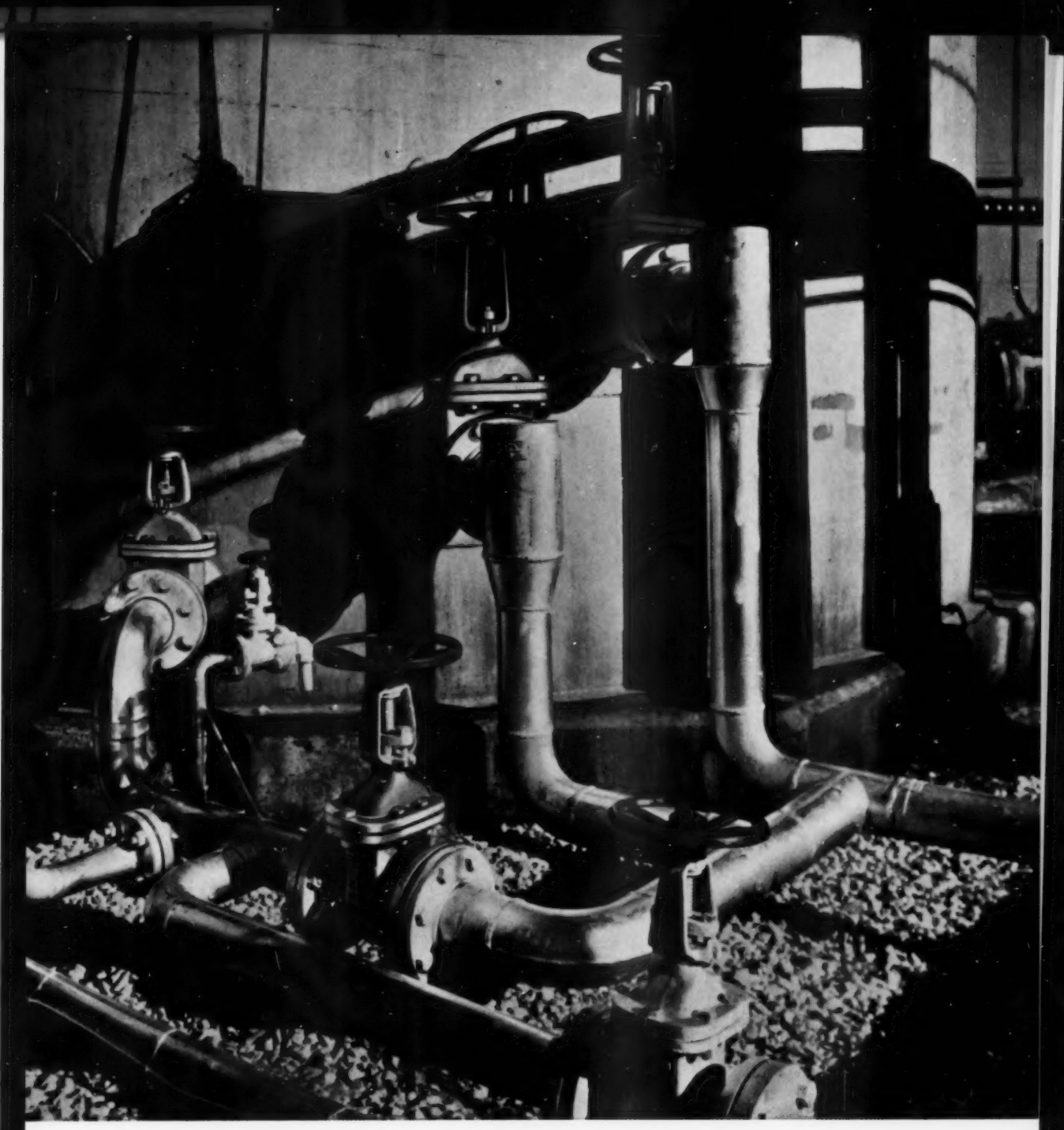
*Company*_____

*Address*_____

ROBBINS & MYERS **hoists • cranes • winches**

For more facts circle 524 on Reply Card

For more facts circle 525 on Reply Card



Meet three synthetic detergent experts

You're looking at a Philadelphia installation of The Atlantic Refining Company (expert #1).

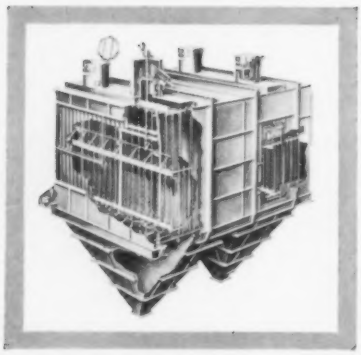
Ultrawet, an important ingredient of synthetic detergents, is the product being processed in this modern plant designed and built by The H. K. Ferguson Co. (expert #2).

Helping to prevent contamination of the product due to corrosion are long-lasting, red-wheeled valves made by Aloyco (expert #3). Made of corrosion-resistant Aloyco 20, the gate and globe valves used here handle a 98% concentration of sulfuric acid at up to 180° F.

Whatever your process, whichever corrosives you need to keep in line, it pays to check first with Aloyco. As the world's largest manufacturer of corrosion-resistant valves exclusively, we're most likely to have the valve you need. Write Alloy Steel Products Company, Inc., 1301 West Elizabeth Ave., Linden, New Jersey. 6.3

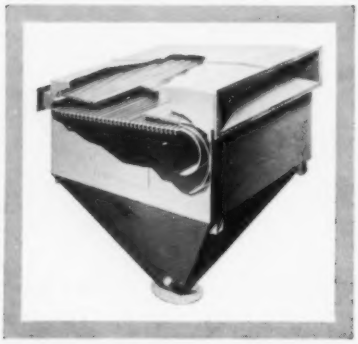
Subsidiary of Walworth Company

How Buell's exclusive Shave-off pays off in extra dust collection efficiency



Buell SF Electric Precipitator also delivers extra dust collection efficiency, due to unique Spiralectrodes and Continuous Cycle Rapping.

Proper proportioning, side entry of dust-laden gases, add even more extra efficiency and long, maintenance-free life to Buell Cyclones. Large diameter design eliminates bridging and clogging, keeps efficiency high under varying loads.



Buell Low Resistance Fly Ash Collector combines top efficiency with low draft loss, for either natural or mechanical draft installations.

For more specific data about Buell's *extra efficiency*, write Dept. 14-L, Buell Engineering Company, 70 Pine Street, New York 5, N. Y.

buell®

MECHANICAL ELECTRICAL *Experts at delivering Extra Efficiency in* **DUST COLLECTION SYSTEMS**

For more facts circle 526 on Reply Card

Hall Industrial Water Report

VOLUME 4 DECEMBER 1956 NUMBER 6

Water Detectives—Industry's Protection Against Loss From Boiler Outages and Costly Repairs

Sources of immediate and potential trouble are easily recognized by engineers skilled in water technology and long experienced in boiler plant operation. Hall Laboratories, Inc. has been providing this detective service for their clients for more than thirty years.

Tube Failures Caused By Low Oxygen!

On his initial visit to a plant in Northern Michigan, Hall engineer C. H. (Buck) Turner found a heavy accumulation of loose iron oxide in two 600 psig boilers.

The history of occasional failure of wall tubes due to overheating and/or thinning indicated that the iron oxide was coming from the boiler metal.

Since all evidence pointed toward an overloaded boiler, Turner recommended that steam flow studies be conducted, but these studies revealed that the boilers rarely reached their designed capacity and normally were at 75 percent or less.

Pondering this anomaly of overloaded tubes in an underloaded boiler as he approached the plant one day, Turner's attention was drawn to the plant's stacks which appeared "hot" and very dark. From experience, Turner knew this meant an extreme load or improper combustion.

Immediate questioning revealed that the carbon dioxide recorders were out of order, but spot checks had indicated carbon dioxide values in the flue gas of over 17 percent. The reported reason for this was that the economizer passes had become filled with ash and the induced draft fan could not handle the combustion gases and air required, even for a moderate load.

Turner knew that high carbon dioxide and periodic positive pressure in the furnace meant high furnace temperatures and that this could mean an overloaded furnace in an underloaded boiler.

Proof of the validity of Turner's conclusions was supplied by operating results following the cleaning of the economizer gas passage with "wet" water. No more iron oxide and a cessation of failures even in seriously thinned water walls. The title is not a misprint. The flue was the clue that low oxygen in the combustion zone had caused the tube failures.

Carryover From Faulty Steam Drum Internals

On one of his periodic service visits to a paper company plant near Pittsburgh, Hall staff engineer Doug Noll was told that a throttle valve on a variable speed steam turbine was sticking because of deposit on the valve stem.

Carryover due to unsatisfactory water conditions was not considered likely since past troubles with variable water levels and foaming had been overcome with the feed of Hagan C-1 Antifoam®. Therefore, Noll decided that the difficulty was due to something mechanically wrong in the steam drum of the boiler supplying steam to this turbine. He proved this with steam purity tests which showed 3-5 ppm of solids in the steam from this boiler and only 1 ppm of solids in the steam from another boiler.

At the first opportunity, Noll, together with the plant men, inspected the suspect boiler. They found the curtain baffle in the steam offtake drum had dropped because of loose bolts. This permitted wet steam to short-circuit from steam circulating tubes to the steam offtake. Inspection also revealed a leak in the feedwater line which could have contributed to the trouble.

The drum internals were repaired and further testing showed steam from the boiler to contain less than 1 ppm of solids. The throttle valve is again functioning properly.

Mischief Caused By Idle Boilers

The engineers in Hall's St. Louis office were really shocked one morning when they received a call from a well satisfied client of long standing complaining about the internal condition of the boilers. Hall engineer Bill Pfeiffer left immediately for the plant to see what could have happened.

Hagafilm® was being fed to prevent condensate line corrosion and the plant personnel felt that this was removing old corrosion products and returning them to the boilers where they adhered to the boiler surfaces. Not convinced that this was the case, Pfeiffer collected samples of the deposit for analysis by Hall's Pittsburgh laboratories. The analysis indicated process contamination.

Pfeiffer checked condensate from all sources but found no contamination. However, the plant operated on a five-day week and Pfeiffer suggested that condensate samples from all sources be collected again early Monday morning when the steam was first turned on.

An amazing amount of emulsified oils, bonderizing solution and highly alkaline material was found in the condensate because of leakage into heating coils when the steam pressure was reduced for the week-end. Repairs were made immediately on the various coils and condensate contamination was stopped. The plant is once again enjoying trouble-free operation of the boilers.

Industrial Water Problems Require Special Handling

There are no "stock answers" to industrial water problems. For information write, wire or call Hall Laboratories, Inc., Hagan Building, Pittsburgh 30, Pa.

Water is your industry's most important raw material. Use it wisely.

Hall Laboratories, Inc.—Consultants on Procurement, Treatment, Use and Disposal of Industrial Wa

For more facts circle 527 on Reply Card

PLANT ENGINEERS' DIGEST so those who rush may read and know what's new

Edited by Marjorie E. Weissman

Cement Block Cured by Steam

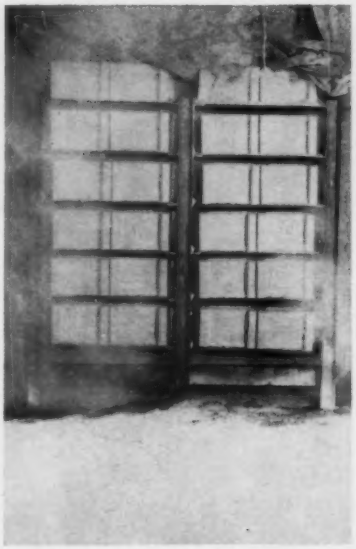
SEVENTY-FIVE per cent reduction in the time required to cure cement blocks has been accomplished by Sunrise Mason Supply Co., Lindenhurst, L. I., through the use of live steam. In addition, losses resulting from handling blocks not yet hard, have been reduced.

Previous method of curing the cement blocks consisted of storing them in the plant yard overnight, a period of about 12 hours. This method, while crystallizing the surface of the blocks, left the insides wet and mushy.

From a 6-in. header constructed on a steel boiler, a pair of six, 1-in. copper tube lines was run to each of four kilns, adjacent to the boiler room. Each kiln, 35 ft long, by 14 ft wide and 8 ft high, holds approximately 1200 blocks. One-quarter inch holes were drilled at 8-in. intervals in the black piping which runs horizontally along the kiln walls 5 ft from the floor. Pipe ends are capped.

Low pressure steam is then passed through the pipes and out over the cement blocks which are placed in the kiln on skids. Controls cut the boiler in when the steam pressure drops to 9 lb and cut it off when the pressure reaches 13 lb. In three hours, the blocks are completely dried.

The boiler is usually fired with natural gas, but during peak winter demand periods, the burner is switched to use No. 2 oil. The boiler is vented through a 15-ft chimney and has as supplemental equipment, an induced draft fan, a low water cutoff and a boiler water feeder.



Cement blocks are cured in a three-hour period by low pressure steam

Domestic hot water for washrooms in the plant is heated by coils in the boiler. *From a release of Heating and Air Conditioning Div., National-U. S. Radiator Corp., Johnstown, Pa.*

Steel Made Without Blast Furnace

CRUDE STEEL has been produced in small quantities in the laboratories of the British Iron and Steel Research Association by a new process that, if considerable practical difficulties were overcome, would make a blast furnace unnecessary. The new steel, named Cyclosteel, is made by blowing droplets of liquid ore through a high temperature gas.

The Bessemer process of steel making came about through the dispersion of air bubbles in a liquid metal. Similar speed potentialities would exist if the system were reversed and small droplets of liquid ore were dispersed in a high-temperature gas.

If this gas could be maintained at a low oxygen potential, the ore droplets would be reduced to droplets of liquid metal plus slag. If the oxygen potential were controlled at the correct value, and lime were introduced for the slag, neither silicon, carbon nor phosphorus need be introduced into the metal.

Thus the droplets would be a form of steel rather than pig iron.

(Continued on page 38)

Fire Fighting Reinforcement Equipment Travels by Fork Truck

Extra fire fighting equipment is transported on a pallet to fire by fork truck

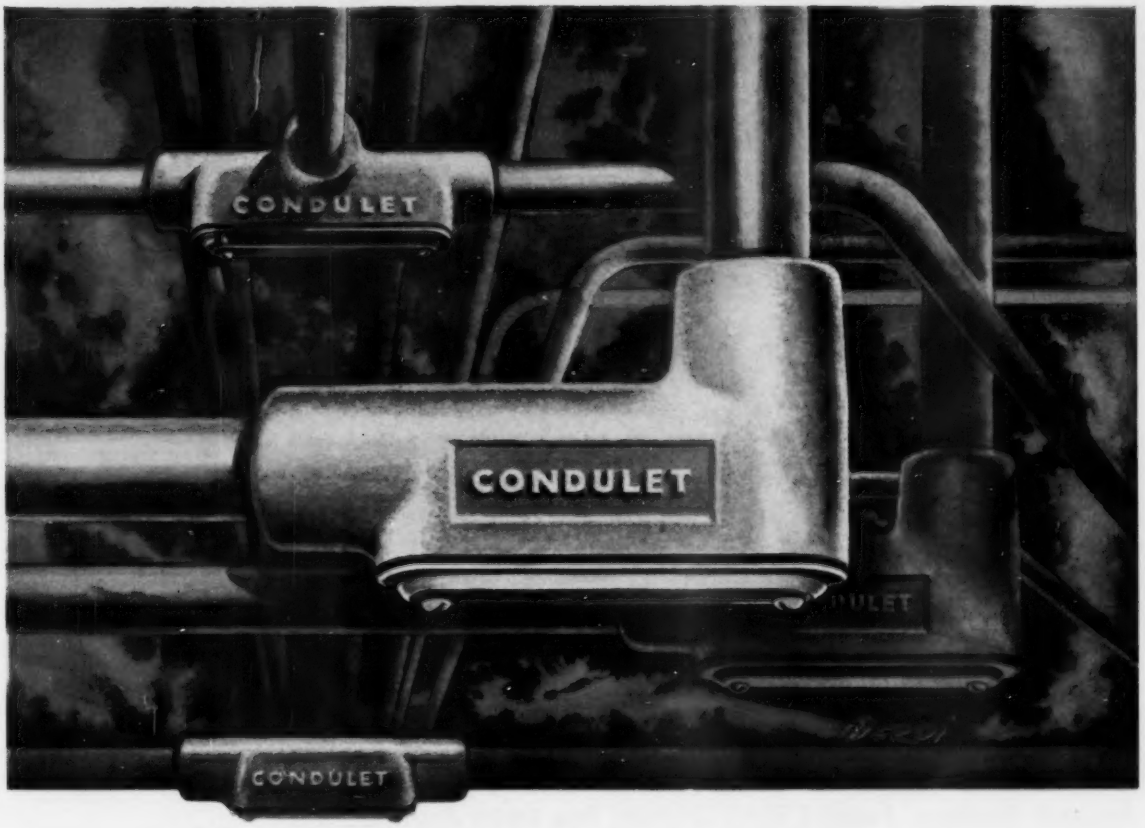
ALTHOUGH three mobile fire extinguishers and numerous hand extinguishers are located throughout the Hoffman-La Roche Company plant in Nutley, N. J., additional protection which can be rushed into action if needed has been provided by a dry chemical recharging unit.

The complete unit is mounted on a pallet and when a fire alarm is sounded, one of the company's 60-man fire brigade transports the pallet load of equipment to the fire on a fork truck.

The equipment includes a recharging unit consisting of six, 30-lb dry chemical extinguishers, 400 lb of dry chemical, a funnel, a powder scoop and a supply of pressure cartridges. Thus, six extra extinguishers are provided and quick recharging of exhausted extinguishers is possible. *From News and Notes, published by Ansul Chemical Co., Marinette, Wis.*

Nothing Beats

CONDULETS* and RIGID CONDUIT for FLEXIBILITY, SAFETY, ECONOMY



- **INSTALL ANYWHERE.** Crouse-Hinds Condulets and rigid conduit operate safely and efficiently under all atmospheric conditions and in all occupancies.
- **INCREASE CAPACITY EASILY.** You don't have to tear out and replace the entire system: merely pull additional wires or put in a larger size.
- **ASSURES MAXIMUM SAFETY.** Condulets are Taper-Threaded to provide a permanent low resistance path to ground.
- **GREATER DURABILITY.** Condulets and rigid conduit provide circuits with more protection against physical damage than any other wiring system. Further, Condulets are made of galvanized cast Feraloy, and resist corrosion.
- **LOWER OVER-ALL COST.** First cost is the entire cost — a minimum of maintenance is required.

COMPLETE FLEXIBILITY

There's a Condulet to meet every need of complex modern electrical layouts. See your Condulet Catalog.

A NATIONWIDE DISTRIBUTION exclusively through ELECTRICAL DISTRIBUTORS

*CONDULET is a coined word registered in the U.S. Patent Office. It designates a product made only by the Crouse-Hinds Company.

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For more facts circle 528 on Reply Card

PLANT ENGINEERS' DIGEST

(Digest begins on page 36)

Finally, the droplets of liquid metal would have to be precipitated out of the gas and the metal allowed to separate from the slag by gravity and surface tension. Laboratory experiments and technical developments in allied fields indicate that this method of producing steel is possible. *From a paper by Sir Charles Goodeve, Director, British Iron and Steel Research Association, presented at British Association for the Advancement of Science, and appearing in Ingot News, published by Richard Thomas & Baldwins, Ltd., London, England.*

Removing Building Parapet

DEMOLISHING 200 tons of terracotta facing and parapet on a building in downtown Seattle, Wash., and replacing it with 200 tons of new material, called for maximum security against falling material, and for innovations to speed the work.

The work was done by hanging a swinging scaffold from 30-ft I beams secured to the permanent base of a large advertising sign on the roof of the building. Debris and new materials were handled by a material tower 156 ft high. The debris was removed by reversing the position of the bucket on the elevator so that it could dump automatically into a truck waiting at the bottom of the elevator. It was considered that this method saved 75 per cent on the cost of handling the material removed from the facing and parapet. *From American Crosby Clipper, published by American Hoist and Derrick Co., St. Paul, Minn.*

Heat Pump Cools Office

TWO RENTED offices, one a large outside general office, the other, an interior office with no provision for outside ventilation, have been air conditioned without permanent alteration to the building, in downtown Cincinnati, Ohio.

By installing a three-ton packaged heat pump, there was no need for plumbing involving the chipping of plaster, laying pipe, replastering and repainting that would have been necessary with other air conditioning systems, since the offices had no ready access to water or drain pipes.

The heat pump, requiring no plumbing at all, was flanged to an adjacent window opening, the window glass being replaced by a louver. Cool air is supplied to the offices through a duct mounted against the ceiling.

No water is required in the operation of the pump since it has an air-cooled condenser. During the summer, moisture which condenses on the cooling coils is collected and sprayed in a fine mist over the outside air-cooled condenser. What moisture does not evaporate is blown into the outside air. *From a release of Westinghouse Electric Corporation, Pittsburgh, Pa.*

Heat pump cools offices, requires no plumbing. Cool air travels through duct

Brazing a Tube and Insert

BECAUSE of the stresses placed upon the tube that supports the seat post of a bicycle, the upper end is reinforced with a short insert. The insert, which is subsequently brazed to the tube, is

(Continued on page 40)

Pneumatic Handling of Powdered Starch Controlled From Central Panel

CLEANLINESS, reduced cost of handling and convenient storage space are the results of changing from mechanical to bulk conveying of powdered corn starch, at Faultless Starch Co., Kansas City, Mo.

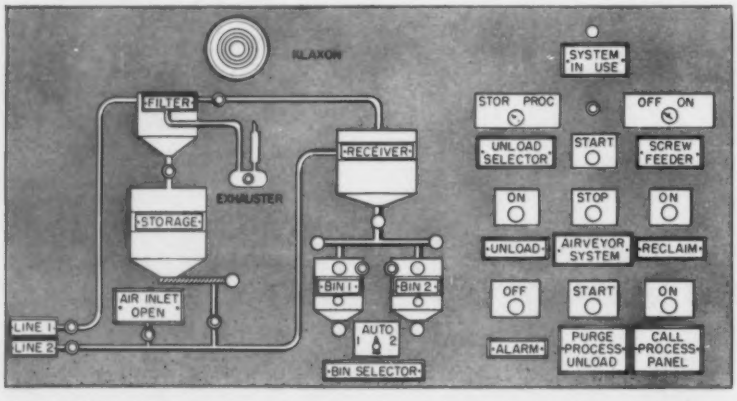
Cost of unloading raw starch, which was formerly delivered in 100-lb and 140-lb sacks, has been reduced, since cost of the sacks has been eliminated, unloading time has been shortened and the possibility of loss due to sack breakage has been eliminated.

To unload the Airslide cars in which the starch is delivered a 6-in. flexible hose and the car nozzle are connected to the intake coupling of the conveying duct. The air supply hose is then attached to the railroad car.

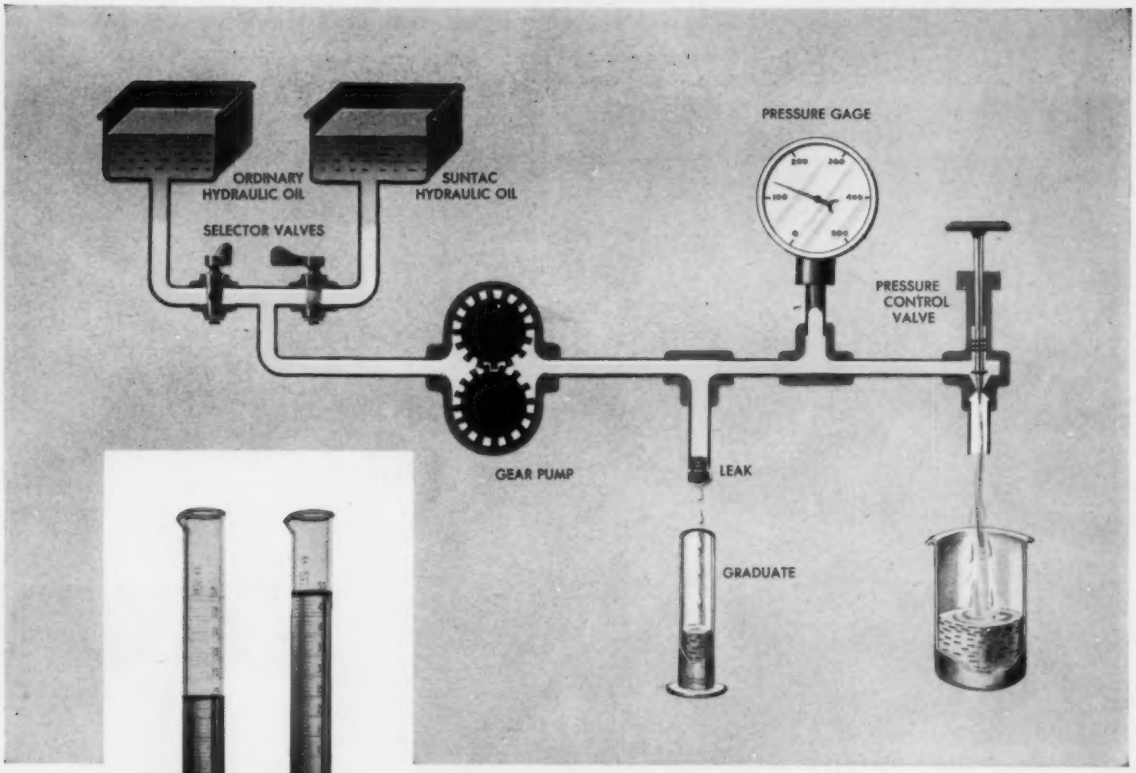
Operations are controlled from a central panel and before unloading is started, all disconnect switches and circuit breakers for power and control units are closed. When the Airslide blower is started, the gate under the car is opened and the starch flows through the conveying line to a 600,000-lb storage bin.

A four compartment type cloth filter located under the roof of the storage silo separates the conveying air flow from the corn starch, allowing the starch to drop, by gravity, through a rotary air lock into the silo.

When the bin is full, a red light shows on the control board and a warning horn sounds. Starch can be unloaded directly from the railroad car to either the storage bin, or to a process bin. *From a release of the Fuller Co., Catasauqua, Pa.*



Push-button control panel for starch handling system. Double lines indicate conveying circuits. Buttons, located under flow diagram on panel, are shown, right



The leak rate of ordinary oil vs. Suntac was measured in test machine simulating a typical leak in a hydraulic system. Oil viscosities were equal, time and pressure conditions identical. The simple act of switching from the ordinary oil to Suntac, *without any other changes*, reduced oil leakage by 50%.

PRESSURE SYSTEM DESIGNED TO LEAK PROVES SUNTAC CUTS OIL LOSSES UP TO 50%

If you're having troubles with excessive oil leakage, a Suntac® oil can help you. Because of their unusual anti-leak characteristics, Suntac oils reduce oil consumption up to 90%, users report.

Suntac oils will not gum up or otherwise harm circulating systems. These oils are high-quality petroleum products with a life expectancy longer than that of ordinary hydraulic and circulating oils.

A change to a Suntac oil can lower your oil costs... improve housekeeping... result in safer working conditions.

Your Sun representative can tell you more about Suntac oils. Or write for Technical Bulletin 23. Address SUN OIL COMPANY, Philadelphia 3, Pa., Dept. PY-12.

SUNOCO

INDUSTRIAL PRODUCTS DEPARTMENT

SUN OIL COMPANY Philadelphia 3, Pa.

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IN CANADA: SUN OIL COMPANY LIMITED, TORONTO AND MONTREAL

For more facts circle 529 on Reply Card

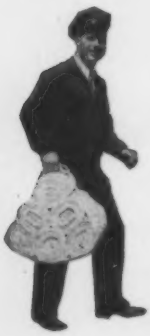
40 years of COTTON* for cleanliness at Western Printing

*Fairfax Towels used by Western Printing and Lithographing Company are supplied by Racine Clean Towel Service, Racine, Wis.

● From a small basement print shop, in 1907, to one of the nation's largest lithographic organizations and the world's largest publisher of children's books and games—that's the growth story of Western Printing and Lithographing Company. And from the very beginning, the company has been distinguished by its personal regard for people and its active interest in better performance.

Just how this attitude works to everyone's advantage is seen in the use of cotton towels in their headquarters at Racine, Wisconsin, for over 40 years. Cleanliness is the major factor, here, along with safety and convenience. Cotton towels remove printer's ink better. They're fresh, clean, soft. They reduce fire threat of volatile inks. They pose no storage or inventory problem.

Progressive management makes use of these many cotton plusses. Why not follow their lead—give the towel job to cotton in your office building, plant, or institution. For free booklet on how cotton towel service will help you, write Fairfax, Dept. P-12, 65 Worth St., New York 13, N.Y.



Here's How Linen Supply Works . . .

You buy nothing! Your linen supply dealer furnishes everything at low service cost—cabinets, pickup and delivery, automatic supply of freshly laundered towels and uniforms. Quantities can be increased or decreased on short notice. Just look up LINEN SUPPLY or TOWEL SUPPLY in your classified telephone book.

Clean Cotton Towels . . .

Sure Sign of Good Management

Fairfax Towels WEST POINT TEXTILES

WELLINGTON SEARS CO., SELLING AGENTS, 65 WORTH STREET, NEW YORK 13

For more facts circle 530 on Reply Card

PLANT ENGINEERS' DIGEST

(Digest begins on page 36)

coiled slightly oversize to provide a force fit keeping it securely located inside the long tube until the two parts are brazed together.

Since the brazing is done on automatic equipment, the assembly created a problem of how to preplace the brazing alloy. The solution was to press a dimple on each side of the insert with an automatic die punch at the time the piece is formed by the coiler. The piece of brazing alloy can then be nested in the depression.

To make the assembly, a piece of brazing alloy is placed in each depression, after the tube has been wire brushed. The insert is tapped part way into the tube. The protruding portion of the insert is brushed with flux and then tapped down until flush with the top of the tube. The assembly is then brazed, making a strong joint between tube and reinforcement. *From a release of Handy and Harman, New York, N. Y.*

Brazing alloy is laid in depression in the reinforcing insert in bicycle frame

Traffic Control with TV

SHIPPING DOCKS with 22-truck capacity, are located indoors on the second floor of our plant. They are connected with the street level by a two-lane ramp. Delays and pile-up of waiting trucks presented a problem until closed circuit television was installed.

A TV camera was mounted midway along the ramp, while a TV monitor was place in the plant guard's office, about 60 ft away from the ramp and on the street level. The TV screen is housed in a master panel along with controls for the electrically operated ramp doors and second floor exit gate.

With the aid of the control panel, one man is able to direct traffic. When a truck on the second floor reaches the

Garlock Silicone Rubber KLOZURE* *Oil Seals*

retain their original properties even after long exposure to temperature extremes that would quickly ruin organic rubber.

They are flexible and serviceable at temperatures as low as —90° F, and as high as 500° F . . . ideal for seals on automotive and aircraft products.

***Klozure Oil Seal with Silicone Sealing Element** for high speed, high temperature applications such as transmission cases, diesel engine crankshafts, and aircraft accessory gear cases. (Model 65 illustrated.)*

Extrusions and molded parts of Silicone Rubber are only part of "The Garlock 2,000"... two thousand different styles of packings, gaskets, and seals to meet all your needs.

It's the *only* complete line . . . that's why you get unbiased recommendations from your Garlock representative. Call him today or write for Oil Seal Catalog No. 10.

THE GARLOCK PACKING COMPANY, Palmyra, New York

***For Prompt Service,** contact one of our 30 sales offices and warehouses throughout the U.S. and Canada.*

GARLOCK

Packings, Gaskets, Oil Seals, Mechanical Seals, Rubber Expansion Joints

**Registered Trademark*

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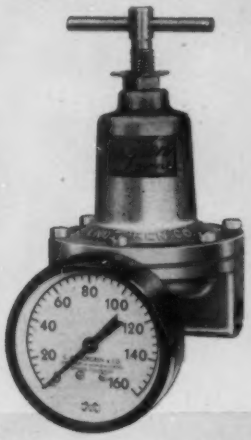
NORGREN
AIR PRESSURE REGULATORS

Accurate, Dependable Control of Air Pressure



There's a High Performance Norgren Regulator for Every Air Regulation Need.

NEARLY 400 STANDARD MODELS

All air-operated equipment is designed to operate most efficiently at one specified air pressure. You can select a Norgren Regulator that will provide this pressure at all times, holding it constant even though the line pressure or rate of flow may vary.

How Norgren Regulators Provide Accurate, Trouble-Free Service . . .

1. PRESSURE KEPT CONSTANT
Quick response to sudden demands for greater air volume.

2. EFFICIENT OPERATION
Greater air flow with less pressure drop.

3. PRECISION CONSTRUCTION
Provides accurate pressure regulation under the most rugged conditions.

4. RELIEVING FEATURE
Safeguards connected equipment against damage due to pressure surges.

5. RUGGED DIAPHRAGM
Made of oil-resistant synthetic rubber reinforced with nylon fabric.

6. EASY TO INSTALL
Pipe connections are in line.

NORGREN AIR PRESSURE REGULATORS, RELIEVING

Relieving feature provides added protection against excessive pressure build-up. Permits downward adjustment of pressure without "bleeding" of line. Maximum allowable primary pressure is 400 psi; adjustable delivery pressure is 2 to 250 psi. Pipe sizes— ⅛" to 1" inclusive. Series 2AX.

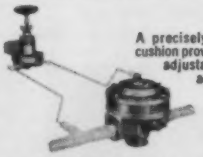
NORGREN AIR PRESSURE REGULATORS, STANDARD

Maximum allowable primary pressure is 400 psi; adjustable delivery pressure is 2 to 250 psi. Pipe sizes—⅛" to 1" inclusive. Series 2A.

NORGREN AIR PRESSURE REGULATORS, PRECISION

For precise control of air pressure in the range of 0 to 2 cfm. Specially suited for use with air-controlled instruments. Maximum allowable primary pressure is 400 psi; adjustable delivery pressure is 1 to 30 psi. Relieving type. Pipe size—¼". Series 11,400.

NORGREN AIR PRESSURE REGULATORS, PILOT-CONTROLLED



A precisely controlled air cushion provides an extended adjustable range, more accurate pressure regulation, increased capacity in cfm. Maximum allowable primary pressure is 400 psi; adjustable delivery pressure is 2 to 120 psi. Pipe sizes—½", ¾", 1", 2". Series 20AA.

Without obligation, learn how Norgren Pressure Regulators can reduce costs in your plant. Call your nearby Norgren Representative listed in your telephone directory, or **WRITE THE FACTORY FOR NEW NO. 700 CATALOG.**

C.A. Norgren CO.

3443 So. Elati St., Englewood, Colo.

Wherever Air is Used in Industry

For more facts circle 532 on Reply Card

PLANT ENGINEERS' DIGEST

(Digest begins on page 36)

Plant guard controls truck traffic to and from shipping docks by television

top of the ramp in the exit lane, its image shows on the screen. Simultaneously, an audible signal tells the guard that the truck is ready to leave the plant. If the street outside the plant is free of traffic, the guard presses a button which opens the ramp door and raises the gate through which the truck leaves the plant.

A microphone, mounted in the wall beside the waiting trucks, allows the drivers to exchange traffic and check-out information with the guard without the driver leaving the truck cab. Prior to this installation, guards had to go outside in all weathers to check every truck in and out of the plant, then return to the office to open and close the ramp gates. *From Zenith Log, published by Zenith Radio Corp., Chicago, Ill.*

Standardized Scaffolding

SCAFFOLDING in our aircraft plant consists principally of framework and platforms, built around a jig, on which employees work. It used to be regarded as a secondary job, to be done in whatever fashion seemed most suitable at that time.

Early in 1954 a group was organized to design all our scaffolding to achieve uniformity, efficiency and low cost.

All parts and sections of the resulting new type of scaffolding are standard for rapid assembly, interchangeability and reuse. Columns are made of 2½-in. or 3-in. steel pipe with six different types of ends. Steel floor support beams are 6-in. I beams and 4-in. T beams in either 10-ft or 20-ft

EXIDE-IRONCLAD BATTERIES

For electric industrial truck operation

Deliver the power over a wide range of temperatures

BATTERY FOR ELECTRIC INDUSTRIAL TRUCK. Exide-Ironclad Model TH. Write for Bulletin No. 5161.

At few places on earth do storage batteries ever encounter such extremes of cold and heat as are used to test Exide-Ironclad Batteries in the laboratory.

These tests prove that Exide-Ironclad Batteries can be depended upon over a wider range of temperatures than they are ever likely to be asked to endure. And they provide tangible extra assurance of dependability at all the more normal operating temperatures.

Extreme temperature performance is especially important when a battery must have continuous dependability. It is often at these extremes that a battery is most needed. And a battery cannot be called dependable unless it can be counted on every day—all of the time.

For more facts circle 533 on Reply Card

The high and low temperature performance of Exide-Ironclad Batteries is a direct result of their unique construction features and special engineering. In countless applications, these batteries have earned an unmatched reputation for long life and high capacity. When you need batteries for heavy duty uses, be sure to specify Exide-Ironclad. Write for detailed bulletin. Exide Industrial Division, The Electric Storage Battery Company, Philadelphia 2, Pa.

Exide®

NIAGARA Aero HEAT EXCHANGER

WATER SAVING
with
Trouble-Free Cooling Equipment

● Cools your jacket water for engines or process equipment or electric apparatus. Your closed system keeps free from dirt or maintenance troubles. You can cool air, gases, chemicals, plating baths, quench baths, welding machines, extrusion and drawing machines and hydraulic presses. You get real precise temperatures, save rejections, lower production costs. Use NIAGARA AERO HEAT EXCHANGER cooling with atmospheric air...saves water, pumping, piping and power; quickly saves its costs.

Convenient Units Up To 30,000,000 BTU Capacity

Write for Bulletins No. 120, 124 and 132

NIAGARA BLOWER COMPANY
Dept. PE, 405 Lexington Ave., New York 17, N. Y.
Niagara District Engineers in Principal Cities of U. S. and Canada

For more facts circle 534 on Reply Card

PLANT ENGINEERS' DIGEST

(Digest begins on page 36)

lengths. Eight types of fittings are used.

Smooth, 15/16-in. galvanized welded steel tubing, which does not require painting, is used for railing. Rails are attached by means of four set screws already in place, the average time required for installation being three minutes.

Scaffold sections are covered with 1-in. plywood, although studies are under way to find a different covering. Standard plywood sizes are used and floor sections are designed for these sizes. Brought to the jigs, standard size sections of scaffold are rapidly bolted together through holes already drilled. Platforms may be as large as 100 ft by 8 ft.

Working areas on the scaffolds are now kept free of obstructions. Electric

Rapid assembly rail fittings, plywood floors are standard scaffold items

cables and air hoses are held off the floor by having outlets close to work points. Drop-leaf floor plates of diamond-marked aluminum are provided at platform edges next to jigs and may be lifted out of the way when an assembly is being moved into a jig. *From Boeing Magazine, published by Boeing Airplane Co., Seattle, Wash.*

Portable Taping Machine

HAND TAPING is still required on some jobs in the electrical industry, such as providing extra insulation at certain points on stator coils or large transformer windings. Bottlenecks caused by slow hand methods have been eliminated by using a small portable taping machine which can be clipped on to the wire at any point during forming. The machine will

Another Feature of the FW Series "SC" Standard Boiler

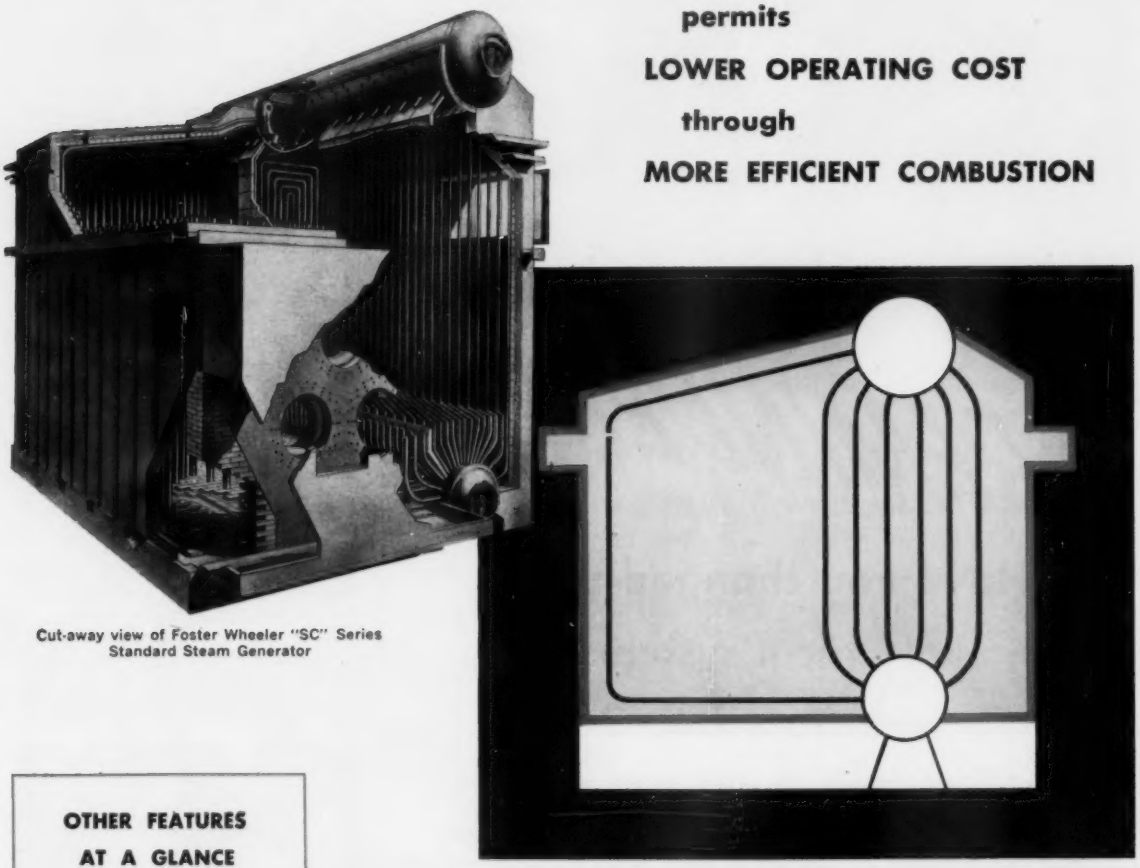
PRESSURE-TIGHT CASING

permits

LOWER OPERATING COST

through

MORE EFFICIENT COMBUSTION



Cut-away view of Foster Wheeler "SC" Series Standard Steam Generator

OTHER FEATURES AT A GLANCE

- Completely water-cooled walls
- Over 19-foot firing depth
- Unrestricted circulation
- Fully drainable superheater
- Efficient convection surface
- Bottom supported unit
- Steam purifying system
- Full insulation

THE ALL-WELDED steel casing of the Foster Wheeler Series "SC" Steam Generator forms a rigid, pressure-tight unit which can be arranged for either pressurized or balanced-draft operation.

By eliminating all possible sources of air or gas leakage, this pressure-tight design increases combustion efficiency and contributes to higher fuel economy per pound of steam per hour. No sliding seals are necessary as the stationary casing is welded to the drums and the differential in expansion provided for by an integral horizontal expansion joint which encircles the entire unit. Pressure-tight ports are provided for observation of burners and flame.

These cost-saving FW Series "SC" Steam Generators are available in capacities from 50,000 to 150,000 lb/hr, for pressures to 1500 psi and superheated steam temperatures to 950F. For further information, write for Bulletin B-55-4. *Foster Wheeler Corporation, 165 Broadway, New York 6, N. Y.*

FOSTER WHEELER

NEW YORK • LONDON • PARIS • ST. CATHARINES, ONT.

For more facts circle 535 on Reply Card

REMINDER!

Have you changed your electrical system over to winter?

Let's reduce motor burnouts this year. Remember to change your motor protectors back to winter ratings.

During the hot summer months, many maintenance departments are forced to up-rate the elements in motor protectors to prevent nuisance stoppages due to high temperatures. When winter comes, they neglect to change back to normal ratings. That's when many motor burnouts occur.

ELIMINATE THE WHOLE PROBLEM

You can lick the whole problem, and eliminate motor burnouts too . . . just by using Heinemann Motor Controllers. The rating of Heinemann Motor Controllers is unaffected by heat or cold. No unnecessary stoppages in summer; no change-overs for winter.

The difference is that Heinemann Motor Controllers operate on power, not heat. Instead of thermal elements, they employ a hydraulic-magnetic principle that you should know about.

Send for a copy of Manual 101, *"What you should know about Circuit Breakers"* and Bulletin 1410 on Heinemann Motor Controllers. HEINEMANN ELECTRIC CO., 128 Plum St., Trenton 2, N. J.

HEINEMANN Motor Controllers

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PLANT ENGINEERS' DIGEST

(Digest begins on page 36)

butt-or-lop tape any shaped section of wire at speeds up to 20 fpm. This rate is approximately 50 times faster than hand taping.

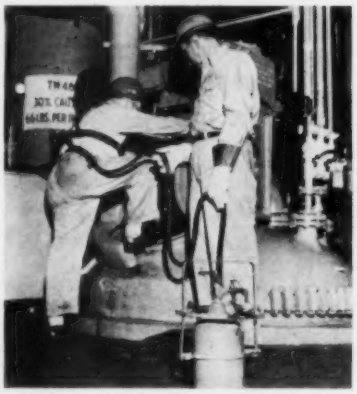
For continuous taping before forming, the machine is clipped on the wire a few feet from the mold. It will operate automatically as the wire is drawn through the mold.

The taping machine has two flexible drives, one controlling speed, the other the style of taping. Standard machine will take round conductors of ⅛-in. to ⅜-in. diam, or rectangular wire ½ in. by 1/16 in. or ½ in. by ⅜ in. Width of tape used is ⅝ in. *From a release of Martindale Electric Co., Ltd., London, England.*

Safety for Clean-Up Crew

INDUSTRIAL SAFETY regulations required constant surveillance of clean-up crews by floor supervisors during tank and vat inspection and cleaning. Freon-gas powered horns, with a distinctive signal, will bring rescue teams "on the double" at an eastern chemical plant to assist these workers should they be affected by toxic fumes.

The horns can be heard above a very high ambient sound level for more than 150 ft. Out of doors, in the plant grounds, the sound travels for more



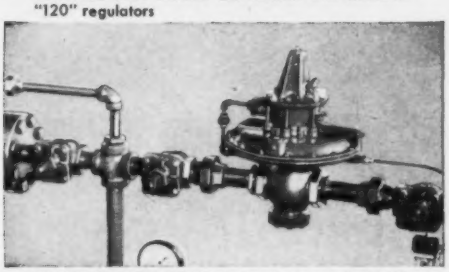
Workers cleaning and inspecting tanks holding chemicals can signal rescue team, should they be affected by fumes, by blast on Freon-gas powered horn

than 100 ft. Decibel rating of the horn is between 116 and 125. Each rechargeable cylinder holds enough Freon gas to produce 500 or more five-second long warning calls. *From a release of Falcon Alarm Co., Inc., Summit, N. J.*

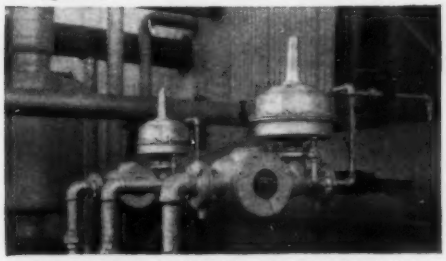
Gas does it best!

For All Industrial Heating Purposes

FURNACE AND BOILER CONTROLS with Rockwell "120" regulators



KILN AND OVEN CONTROLS with Rockwell "1001" regulators



GAS ENGINE CONTROLS with Rockwell "014" regulators

ROCKWELL *Gas Pressure* REGULATORS

A SIZE AND TYPE FOR EVERY NEED

Let Rockwell Gas Pressure Regulators **Improve Your Combustion Control**

No matter what the process when you use gas for heat or power, you need *good pressure regulation* to obtain *good combustion*. A constant, even pressure at the burners means uniform quality in your end products . . . and maximum fuel economy, too.

Rockwell makes a complete line of regulators for either high or low pressure burner control. Among them is the right type and size for any specific application. To help solve your problems in combustion control we invite you to make full use of our field engineering service. Use the handy coupon or write fully today.

Clip Coupon—Mail Today!

Use this handy coupon for literature, a quotation or free engineering assistance

Rockwell Manufacturing Company **Dept. 102M**
Pittsburgh 8, Pa.

Gentlemen:
Please send me bulletin describing Rockwell regulators for low pressure burner control ☐. For high pressure burner control ☐. Please have your field representative call ☐.

Your Name_____

Company_____

Street_____

City_____ Zone____ State_____

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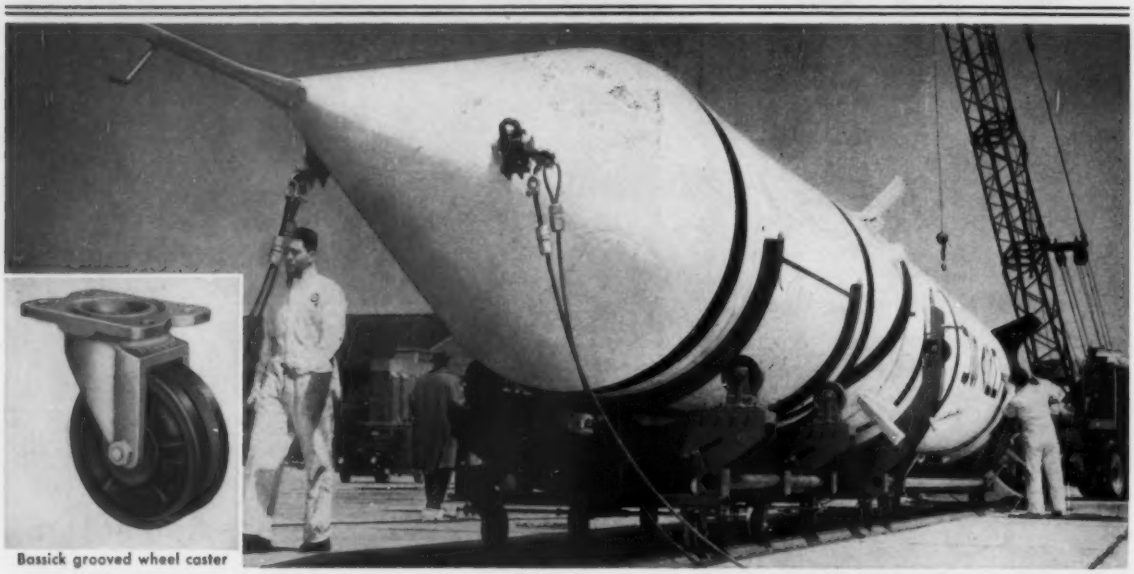
MATERIALS-HANDLING NEWS

★ Panel Discussions by Bassick, World's Largest Manufacturer of Casters and Floor Protection Equipment ★



Bassick grooved wheel caster

Long range missile on Bassick casters

Photographed at the recent Armed Forces Day, the prototype Redstone Army missile gets special handling.

That's why on both top and bottom of the missile stand you see Bassick grooved wheel casters. On inverted-angle iron tracks, they provide absolute control and smooth, safe rolling. The grooved wheel casters on top of the stand are used to rotate the missile to make various instrument ports and panels more accessible.

Note, also, that the stand has movable caster mountings so that the wheels can always be positioned under the missile's center of gravity (which changes during production and as fuel is added). The Army's Redstone is expected to operate at ranges up to 1500 miles.

Fork Lift Truck rides Floating-Hubs

The 3000 lb. capacity Raymond Reach Fork, "the truck with the boarding house reach," operates in narrow six-foot aisles on Bassick Floating-Hub casters. This is rugged duty for any caster, and calls for constant swivelling under power and over all types of floor conditions. Because the Bassick Floating-Hub casters give long life and a stable ride, The Raymond Corporation is very satisfied with them.

THE BASSICK COMPANY Bridgeport 2, Conn. *In Canada:* Belleville, Ont.

See our catalog in Sweet's or write for copy

Bassick

A DIVISION OF STEWART SW WARNER

MAKING MORE KINDS OF CASTERS MAKING CASTERS DO MORE

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Shakespeare on casters

The big stage at the American Shakespeare Theatre, Stratford, Conn., (that's a scene from King John, above) can be moved out of the way for local benefits and community projects. The entire stage moves easily on 44 Bassick Casters.

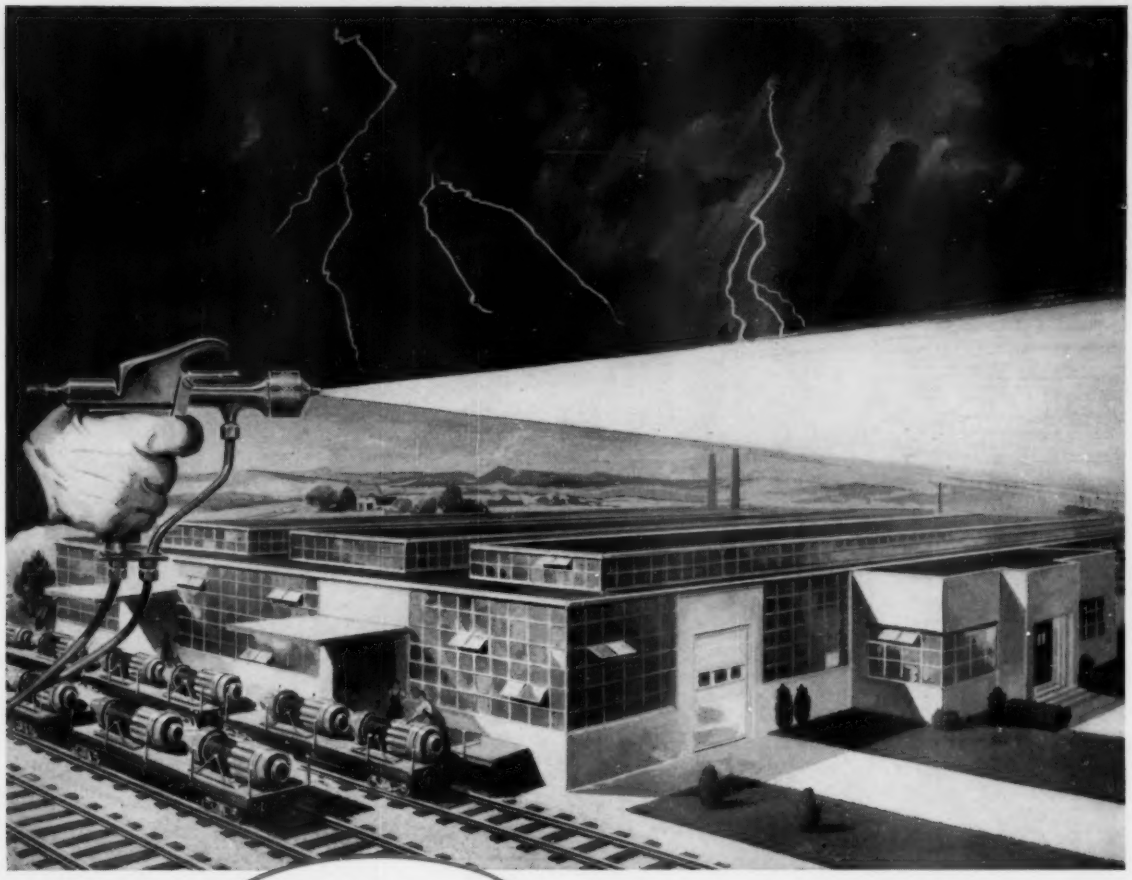
This unusual job is just one of the many new caster applications turning up today. Some of them might pay off in your business; talk to your industrial distributor.

Rol-Rack on Bassicks

That's the name of this rolling book case that's going places on rubber-tired Bassick casters. It's only one of hundreds of racks and furniture that are easier to use (easier on floors, too) with Bassick casters. Maybe some of your plant equipment could do a better job on casters.

Ask your Bassick Distributor

If you let him in on your problems, you'll find his broad experience a big help in working out solutions. And his product knowledge can often save you money, too. Always ask him to recommend which Bassick caster can best handle a specific job. 67



Spray on PROTECTION . . . and wipe out the threat of wear and weather with 6 Exon solution resins

because they're made of

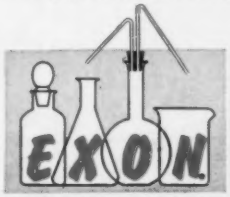
Firestone

To wipe out corrosion by weather, rust and rot, industry looks to the performance and versatility of the 6 specifically-engineered Firestone Exon solution resins.

Formulated into compounds that can easily be sprayed, brushed, rolled or dipped, these 6 resins cover a variety of needs so diverse that virtually every coating purpose and function is served . . . effectively.

Each of the 6 Exon solution resins is engineered for a specific type of application. It may protect a product, a part, a roomful of machinery or the outside of a plant. Some feature so powerful an adhesive grip that they hold fast for many damage-free years. Others are made to peel off clean in seconds.

All are tough, economical vinyl resins that can help save billions of dollars that management once passed off as "necessary depreciation" due to corrosion. They are a few of the many resins in Firestone's complete line of versatile vinyls. Another reason why industry looks to Exon for engineered answers to its needs.



VERSATILE VINYL RESINS
engineered answers to industry's needs

Firestone Plastics Co. supplies only the resins, does not make the finished solutions.

For complete information or technical service on the entire line of Exon resins, call or write today:
CHEMICAL SALES DIVISION
FIRESTONE PLASTICS CO., DEPT. 715B, POTTSTOWN, PA. • A DIVISION OF THE FIRESTONE TIRE & RUBBER CO.

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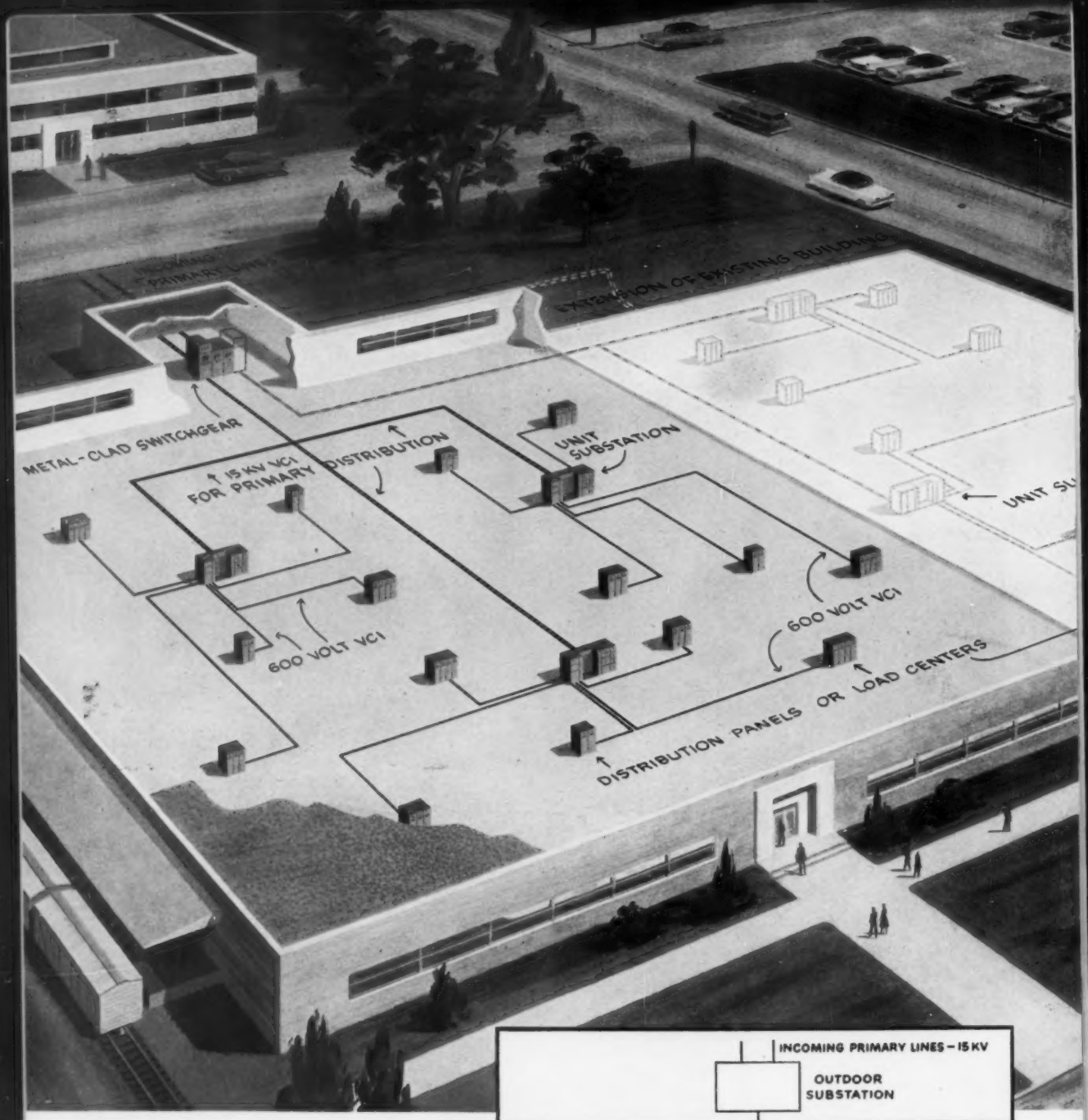
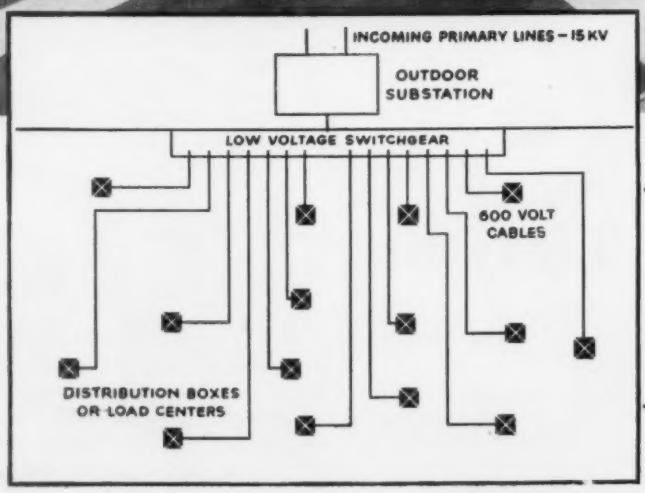
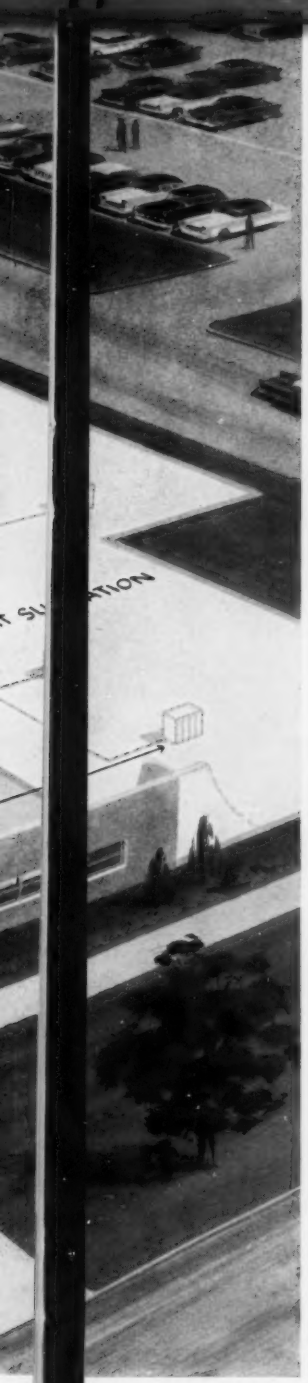


NEW G-E INTERLOCKED ARMOR CABLE SYSTEM reduces voltage drop, costs less to install and maintain, provides for system expansion or relocation (indicated by dotted line area).

OLD-TYPE LOW-VOLTAGE FEEDER SYSTEM has cables in long runs, excessive power losses, and high maintenance costs.





GENERAL ELECTRIC INTERLOCKED ARMOR CABLE provides system flexibility now, expansibility as needed

Individual feeders can be added or re-routed to serve new load areas without major modifications

In new plants, and in plants modernizing their present power handling systems, General Electric interlocked armor cable provides many compelling advantages: reduced cost of materials, lower material handling costs, less installation time, a minimum of layout time—all of which mean a lower total installed cost when compared with a cable-in-conduit installation. (See charts below.)

EASE OF INSTALLATION—This highly flexible, interlocked cable goes in fast—indoors and out, around corners, over beams in long, unbroken runs. The cable is pulled through on low-cost racks, in baskets, on troughs, or on messengers. And, where splicing is necessary, a simple mechanical joint does the job quickly and easily.

EXPANSIBILITY—When you use a General Electric interlocked armor cable system to meet your present needs for more efficient handling of power and reduced voltage drop, you also plan and provide for your future requirements. For this General Electric engineered system provides an open end for growth where additional feeders can be added or where present installations can be moved to new load areas without major modifications.

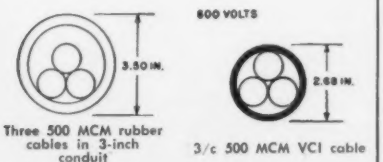
TYPES OF CABLE—Three types of General Electric interlocked armor cable cover most applications: for dry locations, and general purpose duty—varnished-cambric interlocked armor cable is the most economical; for interior *or* exterior locations, above grade or in moist atmospheres—this VCI cable is available with a special protective polyvinyl chloride jacket; and, for both wet and dry locations—Super Coronol* Geoprene* interlocked armor cable eliminates the need for time-consuming potheads and can be run through underground ducts.

Other types of interlocked armor cables are also available with thermoplastic, silicone rubber, and asbestos insulations—with galvanized steel, aluminum, and bronze armor, with or without polyvinyl chloride coating over the armor. *For your copy of the new booklet, "G-E Interlocked Armor Cable," write Section W182-1264, Wire and Cable Department, General Electric Co., Bridgeport 2, Conn.*

*Registered Trade-mark General Electric Company

Progress Is Our Most Important Product

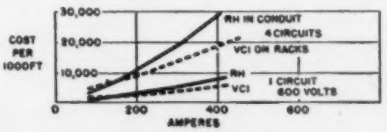
GENERAL ELECTRIC



Three 500 MCM rubber cables in 3-inch conduit

3/c 500 MCM VCI cable

LESS SPACE IS NEEDED Almost 1 inch less space is needed for each 3/c 500 MCM interlocked cable than for cable-in-conduit type installation.



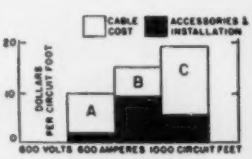
LOWER MATERIAL COST Graph shows $10,000 material saving on 30,000-foot installation. This means more footage for less money.

For more facts circle 540 on Reply Card

A. Two 3/c 350 MCM VCI cables in parallel.

B. Two 1/c 350 MCM cables per phase, in conduit.

C. Bus.



REDUCED INSTALLED COSTS Chart compares the lower cost of G-E VCI system vs. cable-in-conduit and bus systems.

OPERATION AND PRODUCTION pointers for the industrial plant engineer

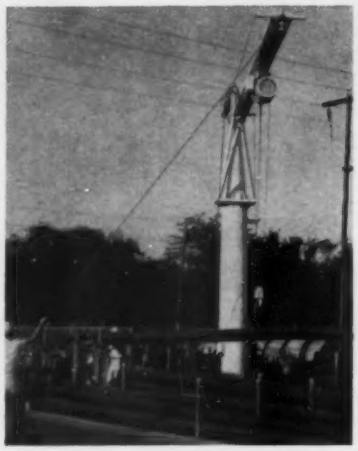
Edited by H. E. B. Anderson

Close Control for Jib Crane

INSTALLATION of a four-ton "inching control" hoist and jib crane at its Vicksburg service center has helped the Mississippi Power & Light Company keep rates down as expenses increased.

The crane, plus hoist (both manufactured by R. G. LeTourneau, Inc.), concrete slab and mountings, represents an investment of about $5500. Judging from the period it has been testing the crane, the utility expects the installation to pay for itself in less than two years.

The old method of handling materials required poles to be at ground level, with the line truck, its trailer attached, spotted at the end of the poles. The winch line was passed over a sheave and headache bar, over the trailer to the pole. The pole was then pulled up and over the trailer into balance position. And, to load any quantity of poles, an A-frame had to be set up.



Jib crane, with inching control, in action in utility equipment storage area

This method required 15 minutes per pole by several members of the nine-man crew who stood by until the equipment was mounted; the new operation takes only about two minutes per pole.

The crane eliminates certain safety hazards and the need for large stockpiles no longer exists. The ability to sort poles according to size makes it unnecessary for the utility to buy carloads of poles in different lengths.

Solenoid Keeps Compressor Cool

Contributed by Howard T. Bailey
Universal Foundry Company

POSITIVE MEANS for automatically controlling the flow of cooling water to a compressor has definite advantage over any manual method. Occasionally, the compressor is started and the water not turned on—a practice that can result in severe damage to the compressor through overheating.

One method to replace the manual operation of the water valve is the installation of a solenoid valve in place of the manually-operated valve. With the solenoid connected directly across

(Continued on page 54)

Built-In Facilities Provide Three Ways To Loosen Lathe Chucks

Contributed by F. E. Riley

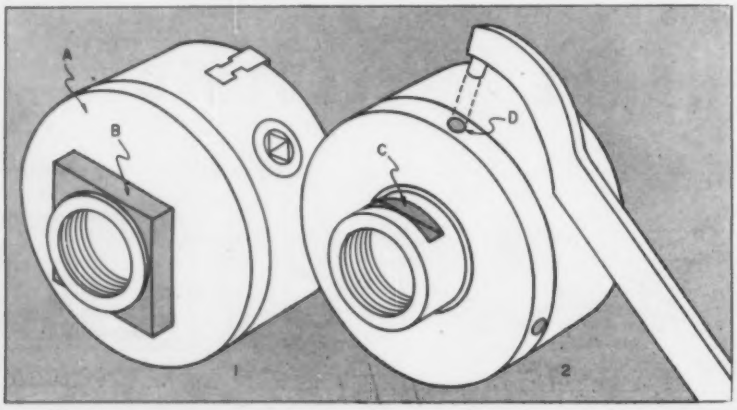
CHUCKS on threaded lathe spindles tend to tighten themselves firmly in place, under the action of the cutting tools. Among various methods of loosening them, is the placing of a block of steel on the rear of the lathe bed and pulling the spindle in reverse until one chuck jaw hits the block. With belt-driven lathes, this feat was not too difficult; with modern geared head lathes, it is difficult to reverse the spindle rotation by hand. In either case, this practice is not good for the chuck.

Another method of loosening the chuck threads requires that the spindle be locked against rotation, by either engaging the back gear or applying the spindle brake. The chuck is then loosened by attaching a shifting spanner to one of the jaws and loosening it with the spanner used as a lever.

The problem of loosening the spindle can be minimized by providing facilities for the operation when the lathe is first installed. One method is shown in sketch 1. Here, a special back plate, A, has been machined to fit the lathe. Backplate boss, B, is a square section, and can be machined to provide flats for the jaws of a wrench. A quick jerk on the wrench will loosen the spindle thread, if the spindle itself has been locked against rotation.

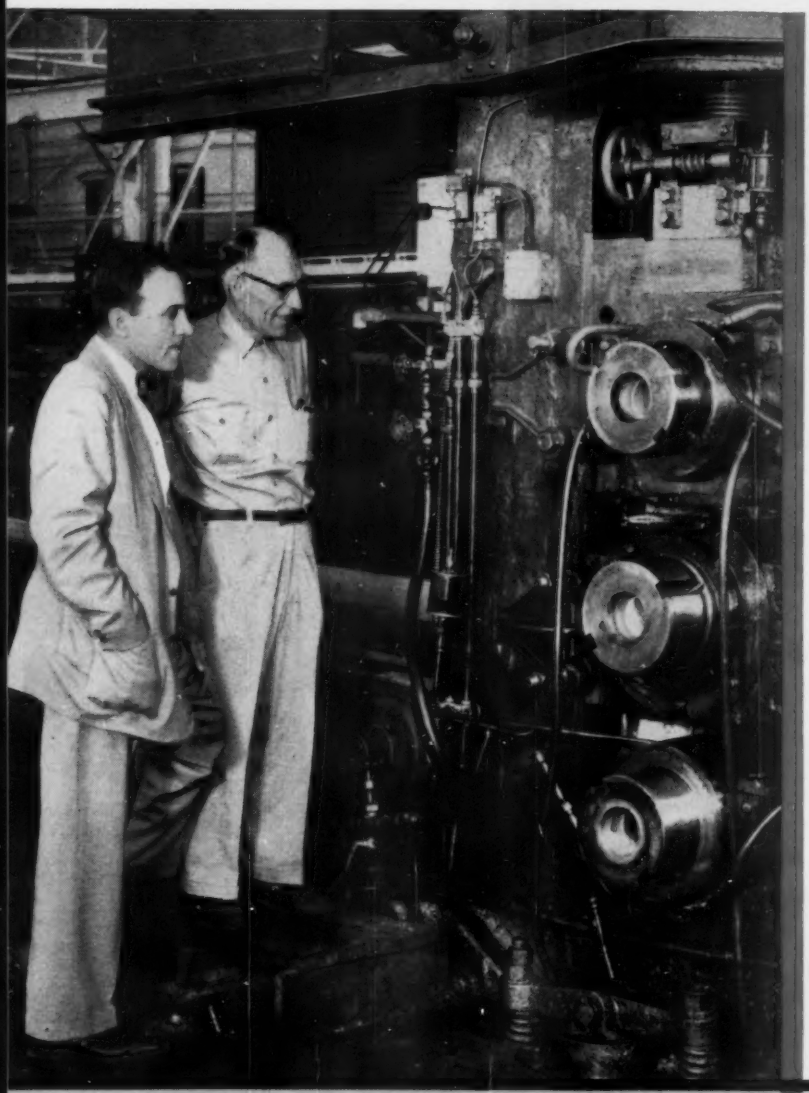
A variation of this idea is shown in sketch 2, and it illustrates a method which is applicable to existing chuck backplates which have a boss of heavy wall thickness. A pair of opposed flats C are machined into the wall of boss, to receive jaws of a wrench.

Also shown in sketch 2 is another method usable with existing backplates. The edge of the backplate is drilled with a shallow radial hole, D, and a special spanner wrench is cut from steel plate. A pin for engagement with the radial hole in the backplate can be welded or brazed in the end of the wrench. This method is obviously limited to backplates which are of sufficient thickness to allow drilling a hole of reasonable diameter without breaking through the backplate casting.



Sketches 1 and 2 illustrate three methods of providing for easy chuck removal

Sick slab roll recovers fast with application of STANOGEAR *Compound*



Eugene Ewald (right), Mill Foreman, and Marshall Fox, Standard Oil lubrication specialist, inspect slab roll. STANOGEAR Compound helped solve lubrication problem on roll neck bearings.

Marshall Fox who proposed switch to STANOGEAR with resultant improved operation, is experienced in providing such technical service. Marsh has a Mechanical Engineering degree from Purdue to qualify him for this work. In addition, he has completed Standard's course for sales engineers. This experience and training, customers find, pay off for them.

A slab roll at Matthiessen & Hegeler Zinc Company, La Salle, Illinois, was sick. It suffered from repeated roll neck bearing failures. Bearing temperatures couldn't be controlled. A consultant was summoned—Marshall J. Fox, Standard Oil lubrication specialist. His diagnosis and remedy: Install STANOGEAR Compound and equip the machine with a central pressure system for application. Recommendations were followed. Result: No bearing failures, due to faulty lubrication, since. Maintenance costs reduced. Time lost through breakdowns slashed.

This was a condition made to order for STANOGEAR to remedy. And Matthiessen & Hegeler knew there was a man at hand who could suggest what should be done. It's another demonstration of what this unbeatable combination can do when put to work:

1 **Standard Oil lubrication specialists capable of giving technical help.**

2 **Top quality products *that deliver results required.***

STANOGEAR Compounds contain special additives making them suitable for applications where heavy loads cause welding, seizure or scoring.

In the Midwest and Rocky Mountain states, a Standard Oil lubrication specialist in your nearby Standard Oil office will gladly give you more information about STANOGEAR. Call him. Or contact Standard Oil Company, 910 So. Michigan Avenue, Chicago 80, Ill.

STANDARD

STANDARD OIL COMPANY

(Indiana)

For more facts circle 541 on Reply Card

OPERATION — PRODUCTION

(O and P begins on page 52)

one phase of the compressor motor the solenoid will open as the motor starts. A constant supply of water is thereby assured, as long as motor is running.

Since the three or four amperes required to operate the solenoid wou'd be added to the motor's full load current, it would be good practice to connect the solenoid above the overhead heaters in order to offset any overload effect on the relays from the additional amperes.

With a control of this type combined with a conventional water temperature control, the possibility of damage from overheating would be eliminated entirely.

Blueprint "Reader"

BLUEPRINTS and wiring diagrams that are handled, studied and constantly removed from storage are highly susceptible to smudging, tearing and other damage that will make them difficult to read.

A desk-top display holder for prints of this type has been developed in the Northrop Aircraft, Inc., missile development laboratory. An entire series of small diagrams can be pasted together and rolled up on the hand-cranked cylinders inside the case.

Turning either handle under reader box, operator can bring print into view

Cranking the handles in either direction brings any desired print into view quickly, and the material is kept smooth and clean.

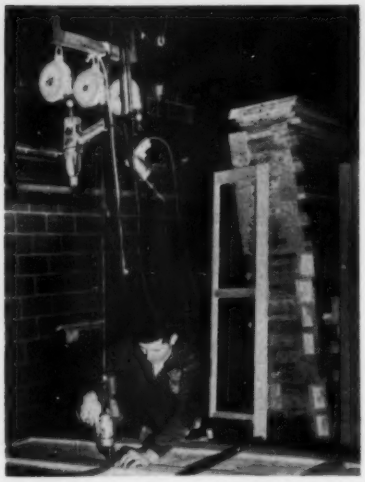
The reader can be made of plywood, with one-inch diameter wooden dowels as rollers. The unit at Northrop is 26 in. wide, 12 in. deep and 18 in. high, fitting conveniently on a desk or workbench.

Reels Keep Tools Handy

TO KEEP portable electric tools conveniently stored, yet ready for instant use, the Overhead Door Co., Inc., has rigged an ingenious device in its plant. With the use of Black & Decker balance reels attached to a two-directional overhead track, a battery of tools consisting of a drill, screwdriver and impact wrench can be kept permanently plugged in and ready for use, suspended over the operator's head.

The company builds large overhead doors folding in units for shipping, and fits them with fixtures. Approximately 400 doors are finished every month, requiring a great amount of drilling and screwing that could only be handled efficiently with portable electric tools.

The balance reel arrangement has taken electric cords off the floor and



With screwdriver in operation, reels hold tools ready for operator's needs

Overhead's foreman reports that with the floor clear of cord tangles and the tools readily available overhead, there has been a definite saving in time. In the area where the doors are assembled, three identical overhead rigs have been installed.

Lubrication Instructions On Tape Keep Information Handy

-LUBRICATION ON TOP-
-10 FITTINGS- USE-D6A2C1- 3 SHOTS-1-WK.
-ON PIPES PERTRUDING THRU FLOOR-
-8 FTGS. -AT FLOOR LEVEL- USE-D6A2C1
-ON 4 HYDR CYL. DIPS- 3 SHOTS-1-WK.
-18 FTGS. PILLOW BEARINGS- PUMP TILL GREASE SHOWS-
-ON FAN SHAFTS- USE-D6A2C5- GREASE 1-WK.
-3 FTGS. ON 3 AIR SEAL MOTORS USE-D6A2C3
-SMALL- GREASE-3 SHOTS-6 MOS.
-3 MOTORS USE-D6A2C3
5 SHOTS-6 MOS.
2 MOTORS - SEALED BEARINGS - NO GREASE REQUIRED
-2 FTGS. USE-D6A2C3
ON-1-MOTOR- 3 SHOTS-6 Mos.
-2 AIR LUBRICATORS- USE-D6B1A2-
-CHECK DAILY-
-WARNING- CONVEYOR MUST BE SHUT DOWN BEFORE AIR CAN BE TURNED OFF TO REFILL LUBRICATORS-

Pressure-sensitive tape of the "write on it" variety is used at General Electric's new Medium Induction Motor plant to spell out lubrication instructions for machine tools. Directions cover all motors on machine, as well as accessories

Scrubber Cleans Varnish Fumes

IN THE MANUFACTURE of varnish, resins are reacted with oils and other ingredients by "cooking." Solvents used in the process are usually volatile liquids possessing a boiling range between 150 F and 550 F. Commonly used solvents include alcohols, aliphatic hydrocarbons, aromatic hydrocarbons, ketones, esters and others.

The cooking operations present a problem in air pollution, since the oils and solvents evaporate to the atmosphere, giving off offensive and hazardous fumes.

On the West Coast, where air pollution is particularly attention-getting, fumes produced by cooking varnish have been successfully eliminated by the use of fume scrubbing systems, among them systems designed and built by Schutte and Koerting Company.

In a typical application at the Wal-

use steam efficiently, economically—choose the trap with . . .

just one moving part

. . . for easy maintenance

After all, a steam trap *should* be simple. Its job of discharging condensate and air from steam lines and equipment, is a simple one. But its importance shouldn't be overlooked. On its effectiveness can rest your economical use of steam . . . the efficiency of your process operations.

With Nicholson steam traps there's just one moving part. Nothing to go wrong. But with all their simplicity, Nicholson traps have the greatest capacity of any trap their size. Plenty of other important features, too, and it'll be well worth your while to check them.

- **Powerful valve action**
- **Tight, positive shutoff**
- **No dribbling, no steam waste**
- **Each unit service tested**

Specify Nicholson, and be sure.

Write today for new Bulletin 10-55

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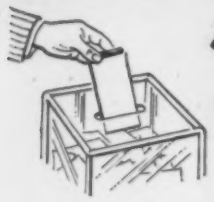
W. H. NICHOLSON and Company

TRAPS • VALVES • FLOATS • METAL PARTITIONS
LAUNDRY, DRY CLEANING AND PRESSING MACHINERY

14 OREGON STREET, WILKES-BARRE, PA. • SALES AND ENGINEERING OFFICES IN 98 PRINCIPAL CITIES

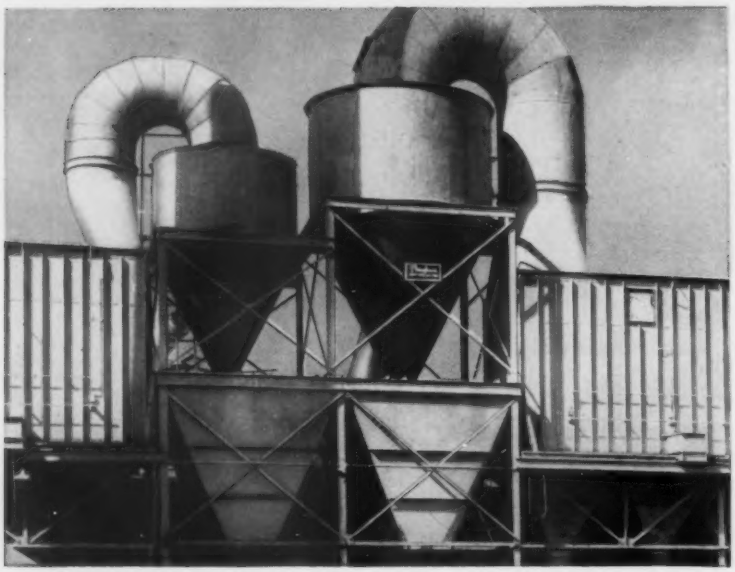
For more facts circle 542 on Reply Card

Henry Chanin Corp. cast its ballot for



Pangborn Dust Control

... and voted itself over $10,000 a year



The Henry Chanin Corp., East Point, Ga., is a processor of textile waste. To control the great quantities of dust released by the operations at this plant, the firm uses four Pangborn Dust Collectors.

Today Pangborn Dust Control has almost doubled production at Henry Chanin by eliminating daily downtime that had been required for machine repairs.

Working conditions and quality of product are both improved. And, thanks to Pangborn, maintenance and labor costs have been lowered by over $10,000 a year!

Pangborn CONTROLS DUST

10D

How do you Vote?

If you're interested in efficient, profitable plant operation, cast this "ballot" for additional information on Pangborn Dust Control. Send to Pangborn Corp., 3200 Pangborn Blvd., Hagerstown, Md.

CAST YOUR BALLOT

☐ Please send me more information on Pangborn Dust Control immediately.

Name_____

Company_____

Address_____

City_____ Zone_____ State_____

For more facts circle 543 on Reply Card

OPERATION—PRODUCTION

(O and P begins on page 52)

ter Boysen Paint Co., four varnish kettles vent off fumes through telescoping hoods and a duct system to a 12-in. SK fume scrubber.

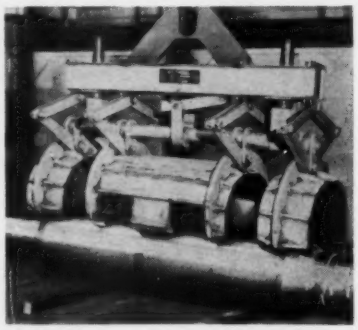
As they enter the scrubber, the fumes consist of liquid particles and gases. The rapid reaction of the water jet physically knocks down the liquid particles. Condensable fumes are removed in quantities up to their vapor pressure level at the discharge temperatures. Non-condensable fumes are absorbed by the scrubbing liquid, and discharged with the liquid into a separator located at the base of the unit.

This 1000-cfm fume scrubbing system recirculates water through the system with a 140-gpm pump operating with a 120-ft head. Only operating costs are for water and power.

When the gas being handled is highly inflammable, as in this installation, SK atomizing nozzles are used at each junction of collecting lines and main suction lines to prevent any possibility of flame propagation between adjacent kettles.

Wrap-Around Roll Tongs

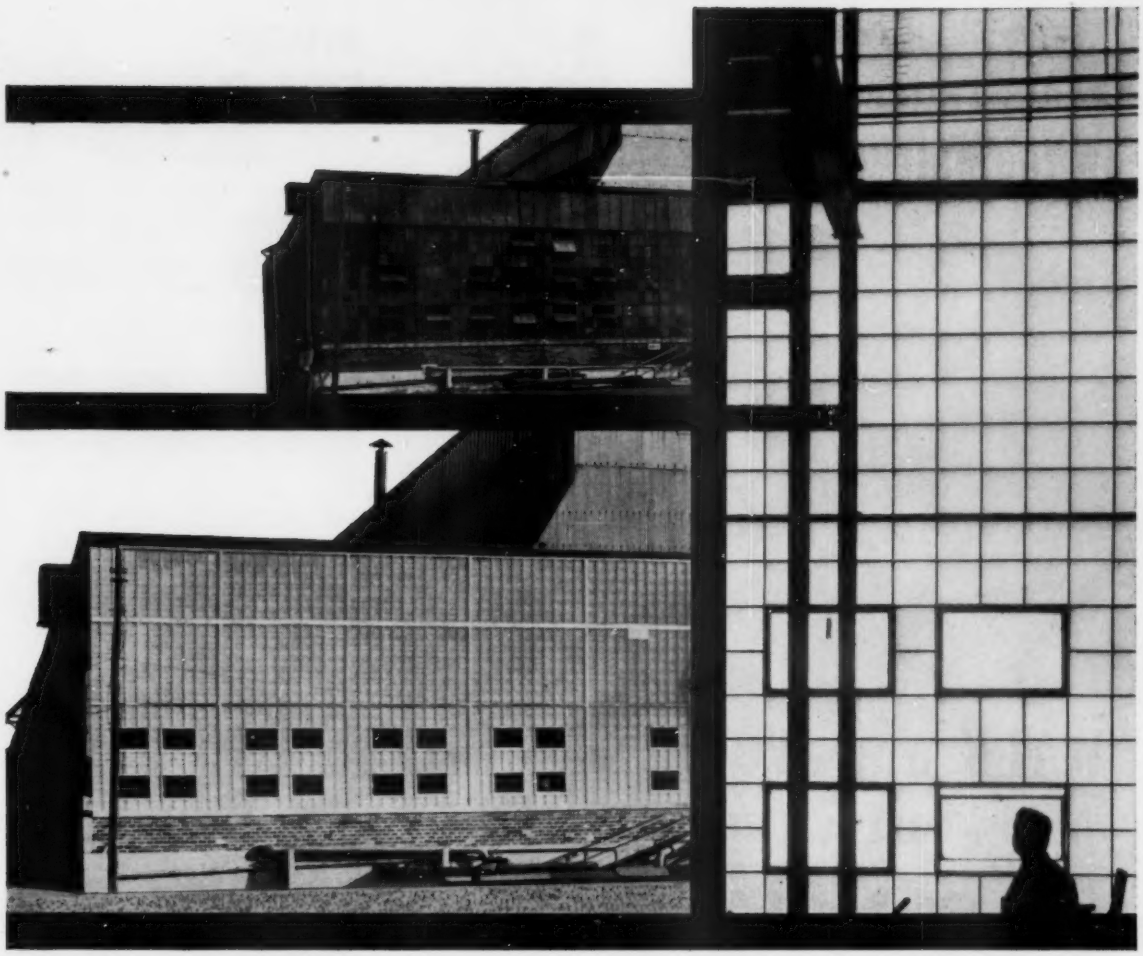
STEEL MILL work rolls being carried from heat treating to stress relieving operations during their manufacture, often undergo sufficient temperature change to cause pieces of metal to fly off the roll.



With jaws locked open, tongs are lowered over work roll to pick it up

To safeguard personnel in such instances, the Homestead Works of the United States Steel Corp. uses specially-designed tongs which carry the work safely and quickly.

Manufactured by Heppenstall Co., the tongs consist of four scissors-type jaws, suspended from a steel beam and equipped with an automatic locking and unlocking device. The jaws en-



Oliver Corporation finds "fix-it-and-forget-it" solution for window-wall maintenance

The big trouble spot was the sash on the west wall of the plant's boiler room and heat treating department. Outside, weather and atmosphere caused rust formations, buckling, paint deterioration. Inside, high temperatures and humidity, mixed with acid bath fumes, created sweating and corrosion. Heat loss during the winter, and drafts, produced worker discomfort. In the summer, workers complained about the heat and glare from the direct rays of the sun.

Major headaches—all of them—until the Oliver Corporation started a modernization program. This South Bend, Indiana, farm equipment manufacturer installed PC Suntrol Glass Blocks, a section at a time to prevent interference with production. In a little more than a month, the job was completed by Builders & Movers Co., Mishawauka, Indiana.

Now, because there is nothing to rust, rot, buckle, or paint with *mortared-in* PC Glass Blocks, maintenance is eliminated, inside and out. The panels form an efficient insulation against heat gain and loss. Drafts are no problem. And the internal prisms in the blocks control the daylight, ban glare. It adds up to a "fix-it-and-forget-it" solution plus an improved exterior appearance.

More facts in Sweet's. Or, write Pittsburgh Corning Corporation, Dept. PG-126, One Gateway Center, Pittsburgh 22, Pa. In Canada: 57 Bloor St. W., Toronto, Ont.

For better looks outside . . .
Better light inside

PC Glass Blocks

PITTSBURGH PC CORNING ®

Also manufacturers of FOAMGLAS® insulation

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Cleats reduce slipping on football fields, but–

WALK and WORK SAFELY

on low-cost A.W. SUPER-DIAMOND

ECONOMY ROLLED STEEL FLOOR PLATE

Forty raised steel figures to the step are your assurance of foot safety. Secrets of SUPER-DIAMOND's anti-slip protection for men and rolling equipment are the diamond design and alternate spacing of figures at right angles and correct distances for maximum friction from any angle of approach. After years of usage, the diamond pattern still retains its safe, comfortable footing . . . still permits quick cleaning and draining.

Made from tough steel floor plate, SUPER-DIAMOND can be fabricated with normal shop equipment. There are no matching problems. Use it structurally, as an overlay or as a complete flooring.

No other floor plate can match A.W. SUPER-DIAMOND's *safety, durability and easy maintenance at so low a cost.*

A.W. SUPER-DIAMOND

ROLLED STEEL FLOOR PLATE

"The diamond in the rough . . . a gem of a flooring."

ALAN WOOD STEEL COMPANY

Conshohocken, Pa.

Please send A.W. SUPER-DIAMOND Booklet SD-9

Name_____

Title_____

Company_____

Address_____

City_____ Zone_____ State_____

Other products: A.W. ALGRIP Abrasive Rolled Steel Floor Plate—Plates—Sheets —Strip—(Alloy and Special Grades)

For plants where oil, water and grease raise special problems of slipping accidents, we suggest a check on the special qualities of A.W. ALGRIP . . . the world's only abrasive rolled steel flooring.

For more facts circle 545 on Reply Card

OPERATION — PRODUCTION

(O and P begins on page 52)

close most of the body of a work roll.

The automatic locking action of the tongs permits all operations to be controlled by the craneman, with no personnel required to fasten chains or rigging.

The tongs are lowered over a work roll with their jaws locked open. When the craneman begins the lift, the lifting action unlocks the mechanism and the jaws close firmly around the roll. When the roll is delivered and set down, lowering the tongs a few extra inches causes the jaws to release the load and lock in the open position.

Tooling Jigs of Epoxy Compounds

SAVINGS OF up to 85 per cent in the first cost of vise jaws, mill fixtures, and drilling chucks have been made by a company that has started making its own tools from Rezolin Toolplastik compounds based on Bakelite epoxy resins. The Smith Welding Equipment Corp., Minneapolis, found that with

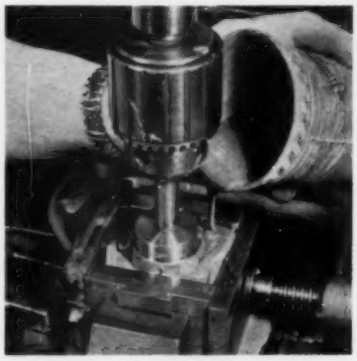


Fig. 1. Plastic compound is poured around tooling setup, allowed to cure

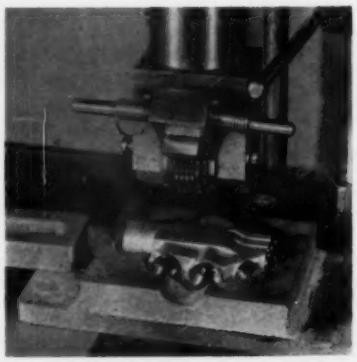
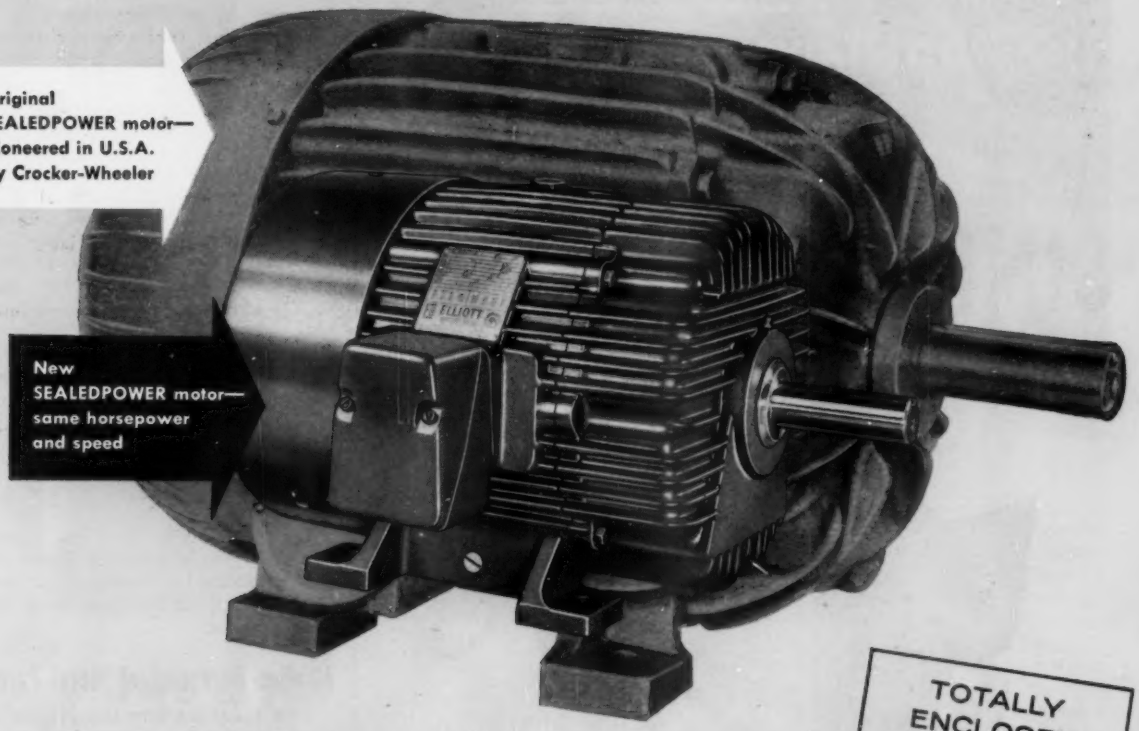


Fig. 2. Plastic jig protects finished parts from nicks in numbering press

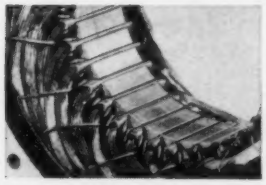
Inside and Outside . . . entirely new



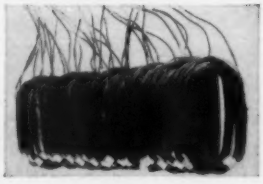
TOTALLY ENCLOSED FAN-COOLED FRAMES 184-326U

NEW Elliott SEALEDPOWER Motors Produce MORE POWER per POUND

Superior Insulation Improves Motor Performance



Stator slots are lined with new, revolutionary synthetic materials having greater dielectric and mechanical strength than those previously used.

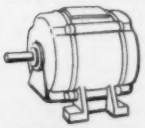


Motor coils are group-wound from continuous lengths of Vinylastic wire, with no brazed or soldered connections within groups.

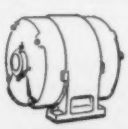
In the new Elliott Crocker-Wheeler Type N motors, better utilization of copper, insulation, and electrical steel produces more horsepower per pound than earlier designs.

This is one of the *balanced design* factors that contribute to the outstanding performance of these motors. Others are highest quality electric steel, rigid frames and brackets, choice of anti-friction bearings to suit your operating and maintenance conditions, and a variety of highly effective enclosures, including dripproof, totally-enclosed and explosion-proof designs.

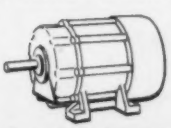
OTHER C-W TYPE N MOTOR ENCLOSURES



Totally-enclosed non-ventilated



Dripproof Protected



Totally-enclosed, fan-cooled Frames 256 U and smaller

ELLIOTT Company
CROCKER-WHEELER DIVISION

***WRITE* for new bulletin describing Elliott C-W Type N Motors. *Address:* Elliott Company, Crocker-Wheeler Division, Jeannette, Penna.**

W6-7

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Here's Lift Power that Lowers Costs!

SIMPLEX JACKS

Engineered to deliver maximum power at minimum weight, Simplex Hydraulic Jacks meet every jacking need with ease, safety and dependability. Eight models, in capacities from 3 to 100 tons, Sold *only* through Industrial Distributors.

Get your free guide to jack selection. Ask for Bulletin HYD. 56.

A Jack for Every Purpose

The Simplex line of jacks is complete. It includes rachet lowering, track, screw and hydraulic jacks; self-contained and remote-controlled center-hole pullers; trench and timber braces. Buyers have known Simplex means quality in jacks for more than 50 years.

WORLD'S LARGEST MFGRS. OF INDUSTRIAL MECHANICAL AND HYDRAULIC JACKS

SIMPLEX JACKS

TEMPLETON, KENLY & COMPANY

2561 Gardner Road
Broadview, Illinois

For more facts circle 547 on Reply Card

OPERATION — PRODUCTION

(O and P begins on page 52)

frequent design improvements and short production runs between changes, tooling costs can become prohibitively expensive.

Production of the butt of the company's pipeline cutting assembly provides an example of how plastic tools are used—nine of the 13 operations required to produce one critical part employ plastic tools. Based on a figure of five dollars an hour for labor and overhead, the manufacture of the plastic tools costs only $751.90, less than half the price of conventional tools.

Lining up the mold and pouring the resin takes about half an hour, and the resin hardens overnight. The epoxy compounds are well suited for this tooling applications, because they can be formed without pressure and will cure to extreme hardness without applied heat.

While primarily short-run equipment, the plastic tools are durable—Smith Welding has chucking jaws that have handled 10,000 parts with no signs of wear.

Alkaline Derusting of Metal Parts

THE ALKALINE derusting process is a valuable tool for removing rust from ferrous metal parts preparatory to plating or other processing. It may also be used to clean brass or magnesium and strip phosphate coatings and paint. It may be used hot or cold, with or without electric current.

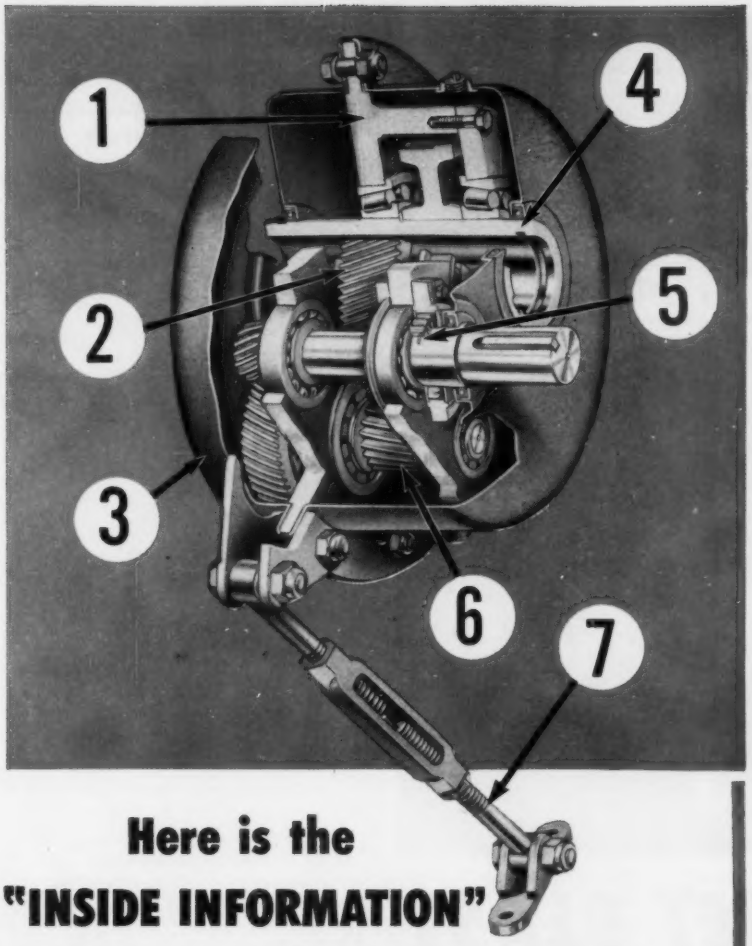
The Rock Island Arsenal, in their laboratory report 55-2462, describe a bath which has been in use for several years. It is prepared by using 2 to 3 pounds per gallon of the following mixed material:

50 per cent caustic soda
25 per cent sodium cyanide
25 per cent ethylene diamine tetra-acetic acid tetra sodium salt

The latter material is commercially available. Several concerns prepare materials of similar composition to the above formulation. Enthone, Inc., produce a product containing cyanide, and other concerns have products which may be used as they are, or to which the user may add cyanide. Oakite, Hanson Van Winkle, Turco and others compound materials of this latter type.

Mild steel tanks may be used to contain the derusting solution. Heating may be conveniently accomplished by the use of steam plate coils.

If electrical current is to be used in



Here is the "INSIDE INFORMATION" on FALK ALL-STEEL Shaft Mounted Drives

Take a careful look inside the Falk all-steel Shaft Mounted Drive, and you will know why this newest member of the famous Falk family is ideal for applications where direct mounting on the driven shaft is desirable. It is the only drive in its field with all these superior "In-built" factors:—

1 **All-steel Frame,** with more than double the rigidity of iron, supports all rotating elements.

2 **Precision Helical Gears,** designed and machined by Falk, rated to AGMA standards.

3 **Pressed Steel Housings,** whose sole function is to keep oil in, dirt out; easily removed for gear inspection without dismounting unit.

4 **Through Hollow Shaft** with counter bore provides for easiest installation or removal from driven machine shaft extensions.

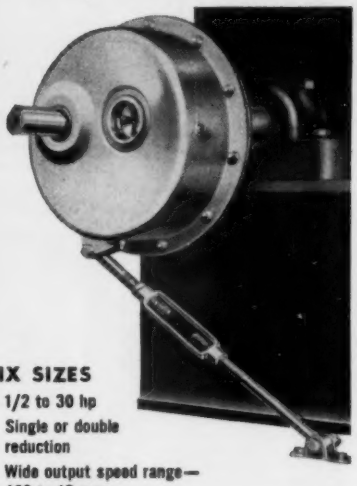
5 **Backstop** can be furnished with the unit or added later for positive prevention of reverse rotation.

6 **Positive Lubrication,** continuous direct dip of revolving elements at all speeds.

7 **Tie Rod** and turnbuckle serve as anchor and facilitate V-belt or chain adjustment.

Write to Department 247 for engineering bulletin, including selection and dimension details.

EFFICIENT SPEED REDUCTION IN LIMITED SPACE

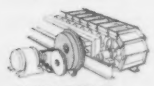


SIX SIZES

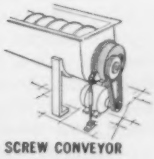
- 1/2 to 30 hp
- Single or double reduction
- Wide output speed range—420 to 10 rpm

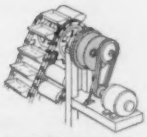
Expressly designed for topflight performance on installations requiring considerable speed reduction in limited space, the all-steel FALK Shaft Mounted Drive has quickly won acceptance throughout industry. This sturdy, compact, versatile reducing unit is an ingenious variation of the highly successful FALK Motoreducer design, pacemaker in its field for more than 20 years. Here, the time-proved design is adapted for mounting directly on the shaft to be driven, using V-belt connection to motor. Investigate now!

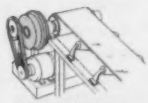
A FEW TYPICAL APPLICATIONS

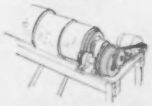

APRON FEEDER

LINE SHAFTING


SCREW CONVEYOR


BUCKET ELEVATOR


BELT CONVEYOR


GRAVEL CLASSIFIER

THE FALK CORPORATION, Milwaukee 8, Wisconsin

MANUFACTURERS OF

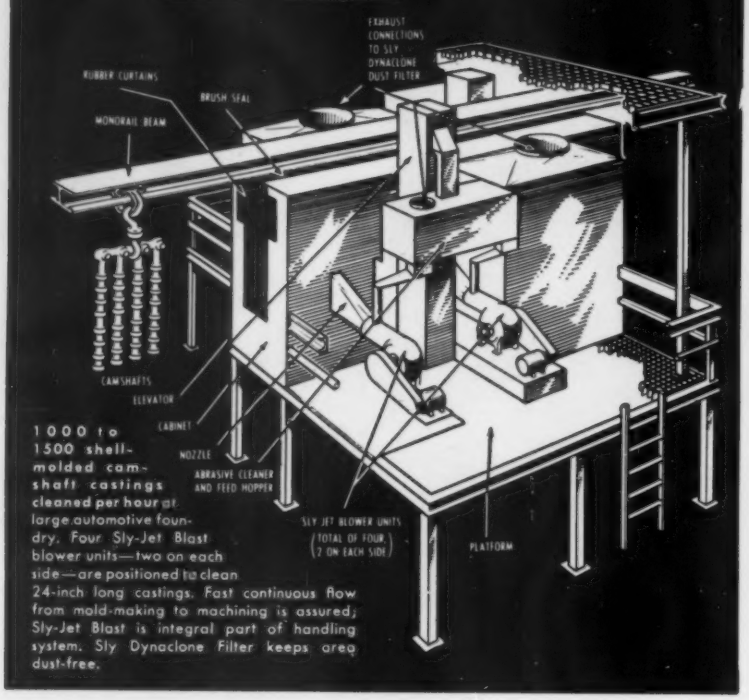
- Motoreducers
- Speed Reducers
- Flexible Couplings
- Shaft Mounted Drives
- High Speed Drives
- Special Gear Drives
- Single Helical Gears
- Herringbone Gears
- Marine Drives
- Steel Castings
- Weldments
- Contract Machining

FALK

...a good name in industry

For more facts circle 548 on Reply Card

NEW LOW-COST WAY TO CLEAN SHELL-MOLDED CASTINGS



1000 to 1500 shell-molded camshaft castings cleaned per hour at large automotive foundry. Four Sly-Jet Blast blower units—two on each side—are positioned to clean 24-inch long castings. Fast continuous flow from mold-making to machining is assured; Sly-Jet Blast is integral part of handling system. Sly Dynaclone Filter keeps area dust-free.

NEW SLY-JET BLAST

Eliminates need for air compressor . . .
Eliminates maintenance costs of airless wheels

Now, clean shell-molded castings faster, at lower cost. With new, *low-velocity* Sly-Jet Blast, cleaning action is thorough yet "gentle"— therefore, no pitting, no removal of parent metal, no warping or distortion as with other cleaning methods. *Efficient*—abrasive is accurately directed over a large work area through a stationary nozzle, which can be set at any angle from horizontal to vertical. *Economical operation*—blower unit is powered by electric motor; there is no compressor, no need for high horsepower. *Long, trouble-free operation*—there are no moving parts in the blast zone; abrasive is introduced directly into the nozzle. *Versatile*—nozzle opening can be in any shape from circular to rectangular and any size. Abrasive can be any grade of sand, most grades of grit. *Non-stop operation*—cleaning mechanisms can run continuously for effective integration in continuous-flow handling systems.

Take the problem and expense out of cleaning shell-molded castings. Write today for the facts on new Sly-Jet Blast.

THE W. W. SLY MANUFACTURING CO.
SINCE 1874
4600 TRAIN AVENUE • CLEVELAND 1, OHIO
OFFICES IN PRINCIPAL CITIES
For more facts circle 549 on Reply Card

OPERATION—PRODUCTION

(O and P begins on page 52)

the derusting process, and its use is strongly recommended by RIA, a d-c source of 6 or 12 volts is required. Capacity depends on area of work to be processed. Not less than 50 amp per square foot of area should be provided.

The rate of rust removal is increased with increased current densities. The rate of removal of rust, especially black iron oxide, is also increased by the use of periodic reversal of the current. On generators this may be simply accomplished by the use of an electric timer switch which automatically reverses the generator field current. On rectifiers, the a-c supply must be reversed. This equipment is heavier and more costly.

The parts to be processed are made cathodic and the tank serves as the anode. In the use of periodic reverse, the timer should be set so that the work is cathodic for 10 seconds and anodic 5 seconds.

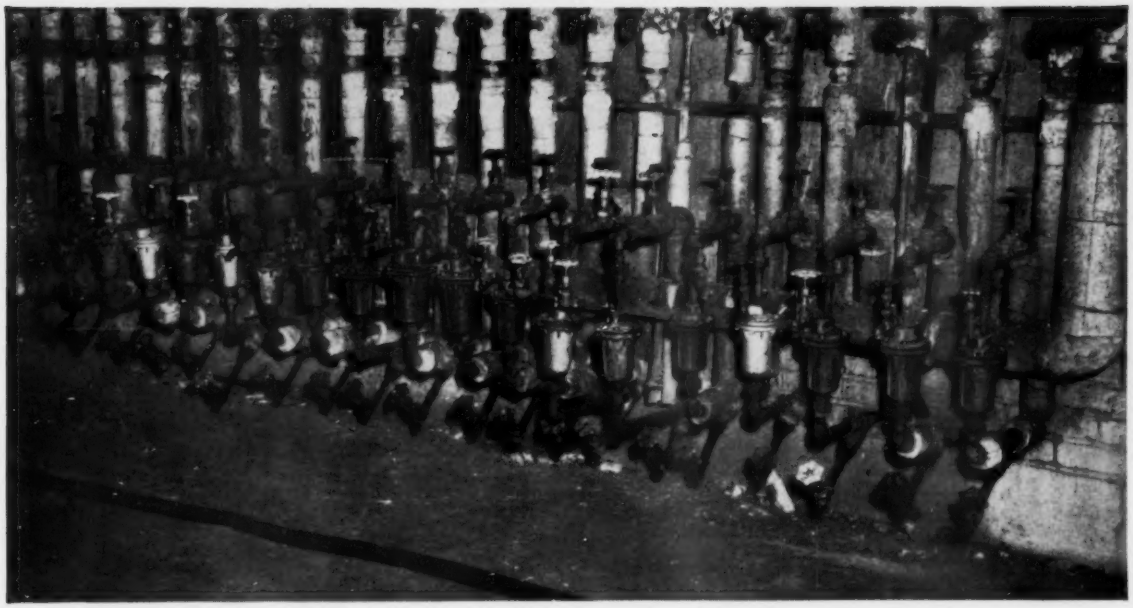
The bath may be operated at room temperature, but the efficiency is considerably increased by operating at a temperature of 130 F. Baths containing cyanide may be operated at 150 F, at the expense of more rapid cyanide decomposition. Baths containing no cyanide may be used up to the boiling point.

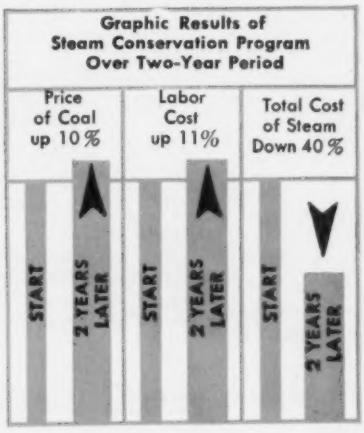
The derusting bath has a long life. Analysis may be made using conventional methods for caustic and cyanide. The EDTA-4Na may be determined by titration with standard calcium chloride using ammonium oxalate as an indicator. The calcium chloride is standardized by titrating against known amounts of EDTA-4Na. Replenishment may be made by additions of the individual chemicals or by additions of the commercial materials, as the case may be. Eventually the bath will be contaminated to the extent that it should be renewed.

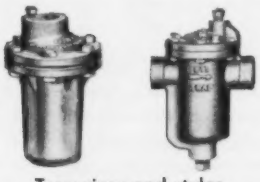
The bath should be well vented because of entrainment of the solution due to gas evolution. A wetting agent such as cetyl betaine sulfate, added in small amounts, will lessen this tendency by the formation of a thin blanket of foam on the surface. An excess should be avoided as a minor explosion hazard results from a thick layer of hydrogen and oxygen gas bubbles which may be ignited from a contact spark.

Workmen operating this process should wear goggles, rubber gloves and an apron or protective clothing.

How a Major Chemical Company Cut Steam Costs $100,000 Annually







Trap sizes and styles
for every condensate drainage job.

Armstrong Traps were a "Major Factor" in Steam Conservation Says Chief Engineer

Steam waste has a way of creeping up on you. Especially in older plants. The losses can make a staggering total.

Plants looking for a way to fight rising costs can well take a page from the 8-point steam conservation program that netted a major chemical plant $100,000 annual saving:

1. **Waste steam utilized** — all flash steam recovered for building heating.
2. **New steam traps installed** — Armstrong traps replaced old traps throughout the plant, indoors and out.
3. **Steam leaks repaired.**
4. **Insulation repaired.**
5. **All condensate recovered.**
6. **Steam piping simplified.**
7. **Steam turned off when not needed.**
8. **Preventive maintenance improved** to insure a continuous checkup on sources of waste.

In commenting on the program, the Chief Engineer of the plant stated, "*4000 new Armstrong steam traps were one of the major factors in conserving steam. The traps, plus improved installation practice, have reduced annual trap maintenance parts and labor by $25,000 as compared to traps previously used.*"

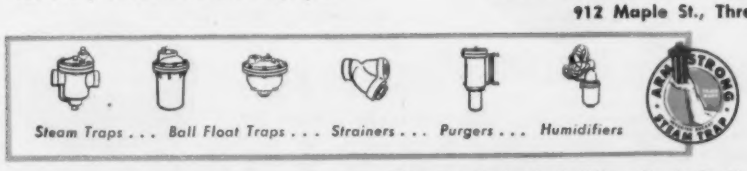
Want all the facts? Tips on cost-saving standardized trap hookups? Facts about Armstrong traps? Ask for:

1. The No. 1, 1956 issue of the Armstrong Trap Magazine containing complete details, drawings and photos.
2. The 44-page Armstrong Steam Trap Book, a fact-full guide to better trapping.

Call your local Armstrong Representative or write:

ARMSTRONG MACHINE WORKS

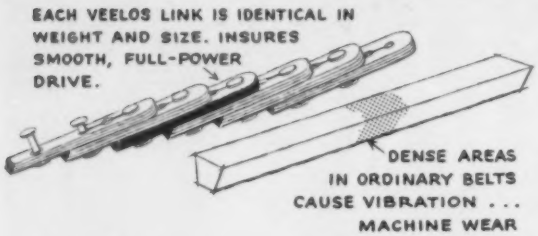
912 Maple St., Three Rivers, Michigan



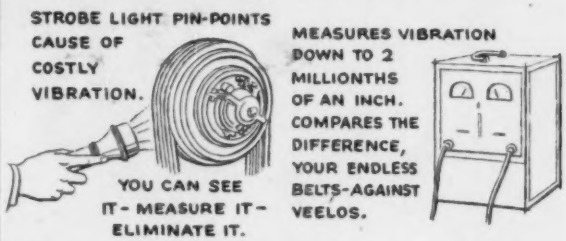
ARMSTRONG STEAM TRAPS

For more facts circle 550 on Reply Card

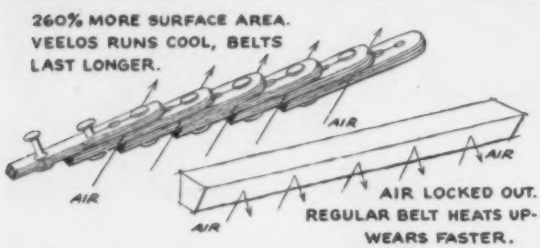
Six Reasons Why Veelos Adjustable V-Belts Are Better For Your Drives!


EACH VEELOS LINK IS IDENTICAL IN WEIGHT AND SIZE. INSURES SMOOTH, FULL-POWER DRIVE.
DENSE AREAS IN ORDINARY BELTS CAUSE VIBRATION . . . MACHINE WEAR

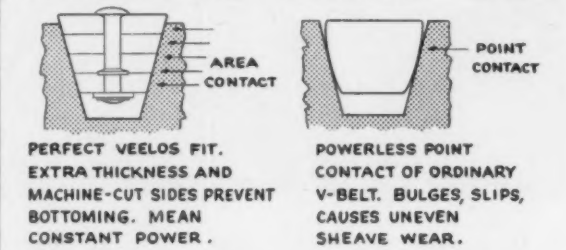
1. Balanced construction of Veelos Belts assures you faster, cleaner work, less rejects . . . less bearing wear. Each link and stud is identical in size and weight. Ordinary belts have varying spots of density which cause excess vibration—chatter marks, machine wear.


STROBE LIGHT PIN-POINTS CAUSE OF COSTLY VIBRATION.
YOU CAN SEE IT - MEASURE IT - ELIMINATE IT.
MEASURES VIBRATION DOWN TO 2 MILLIONTHS OF AN INCH. COMPARES THE DIFFERENCE, YOUR ENDLESS BELTS-AGAINST VEELOS.

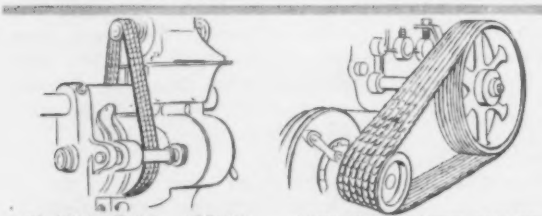
2. Electronic proof—up to 90% less vibration! With a vibration analyzer, you see, on your own machine, how Veelos belts decrease vibration up to 90% over any belt you're now using. This amazing Veelos test pin-points the belt that has the "invisible shakes."



3. Cooler running—long life! Veelos breathes! Constant circulation of air keeps Veelos running smooth. Regular V-belts have no chance to cool, heat builds up from the inside . . . causes slippage, wastes power, heats bearings, reduces belt life.


AREA CONTACT
POINT CONTACT
PERFECT VEELOS FIT. EXTRA THICKNESS AND MACHINE-CUT SIDES PREVENT BOTTOMING. MEAN CONSTANT POWER.
POWERLESS POINT CONTACT OF ORDINARY V-BELT. BULGES, SLIPS, CAUSES UNEVEN SHEAVE WEAR.

4. Greater flexibility reduces slippage! Sectional construction, beveled links allow greater flexibility, longer belt life. Each link moves around sheave independently and maintains full contact, constantly. Full area contact allows shorter centers, smaller sheaves.


NO DOWN-TIME. VEELOS FITS ANY DRIVE - WITHOUT DISMANTLING.
EACH VEELOS BELT CAN BE ADJUSTED - NO NEED FOR EXPENSIVE MATCHED SETS.

5. Simple installation "knocks out" down-time! Saves up to 50% installation time on outboard bearing drives, more when belt length isn't in stock. No resetting, tilting or moving motors. Veelos can be made any length, can be changed by adding or removing links.

6. Veelos won't stretch any more than ordinary endless V-belts when it is properly installed. *Remember—measure Veelos 1" short per foot and roll on drive as tightly as possible.* With the first few revolutions Veelos studs accept a permanent set into the sections they connect.

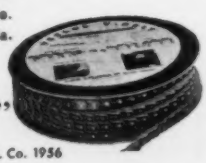
4 TYPES—FOR ALL DRIVES

VEELOS
THE BALANCED LINK V-BELT
Known as Veelink outside U.S.A.

Write for free Veelos Data Book or Veelos Vibration Demonstration to:

MANHEIM
Manufacturing & Belting Co.
404 Stiegel St., Manheim, Pa.

"Industrial Belt Specialists Since 1911"

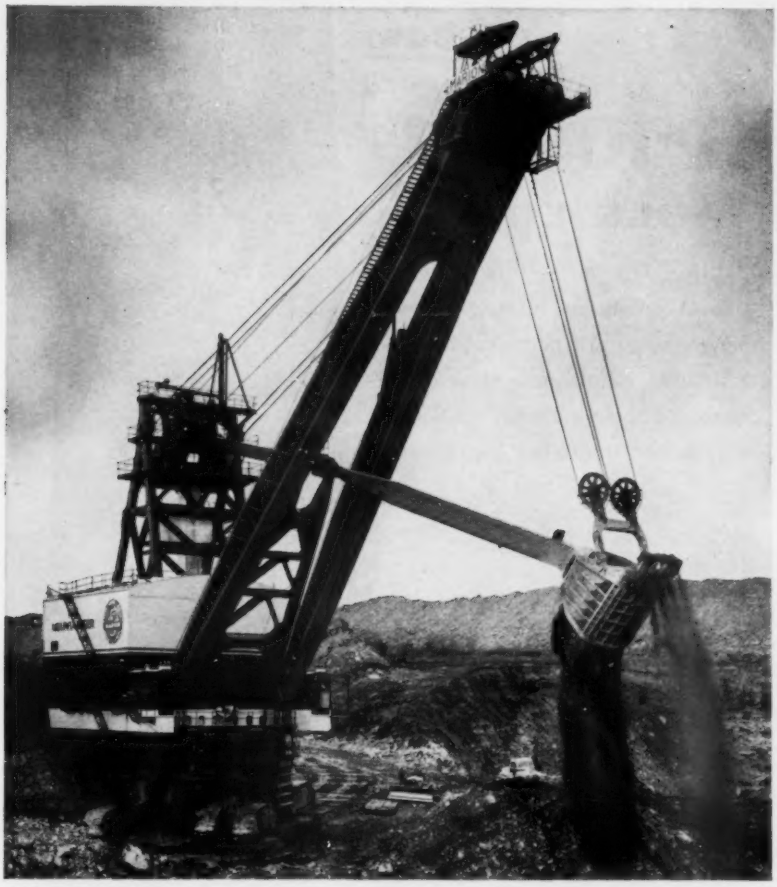


For all sizes and types of drives. Double-V available for serpentine drives.

© M.M.&B. Co. 1956

For more facts circle 551 on Reply Card

Dry-Type Transformer NEWS



A point of interest: "The Mountaineer" can uncover a seam of coal lying beneath a 90-foot overburden of soil and rock.

General Electric dry-type transformers help maneuver over two thousand tons of mechanical brawn

This is "The Mountaineer," giant power shovel built by the Marion Power Shovel Company for the Hanna Coal Company, Division of Pittsburgh Consolidation Coal Company. To assure fast, dependable maneuverability of the over two-thousand-ton shovel, engineers teamed General Electric control, and voltage-stabilizing transformers. Result: by providing stabilized output to control circuits, the G-E transformers help make it possible for "The Mountaineer" to lift 90 tons, deposit the tonnage 290 feet away, and return for another load in 45 *seconds*.

Alkanex wire trims down size, weight of G-E dry-type transformers

Here's another General Electric "first" in the development of quality dry-type transformers. New, heat-resistant aluminum Alkanex wire is being used to make General Electric dry-type transformers lighter, easier to handle. Weight and size reduction of the transformers results in at least three immediate benefits: reduced shipping costs, easy portability during plant relocation, and space-saving installation in out-of-the-way wall or ceiling areas.

General Electric dry-type transformers and saturable reactors pay for themselves in three months

By substantially increasing the productive capacity of a "booster-melting" glass furnace, the General Electric transformers and saturable reactors paid for themselves in 90 working days. The G-E equipment provides an extra boost of electric heat, decreasing viscosity of the molten glass, and thus making the glass easier to pour, easier to mold. For further information write General Electric Company, Section 410-25, Schenectady 5, New York.

Progress Is Our Most Important Product

GENERAL ELECTRIC

For more facts circle 552 on Reply Card

ADVANCED DESIGN!
COMPLETELY EQUIPPED!

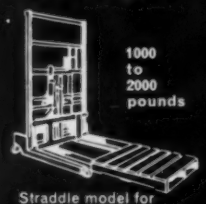
COLSON'S NEW, LOW-COST

"Half-tonner"

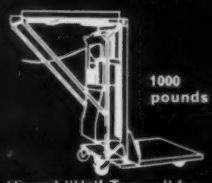
PORTABLE LIFTER

The Colson "Half-Tonner" offers unusual economy and versatility in lifting various materials weighing up to 1000 pounds. This is a ruggedly constructed, narrow-aisle close quarters lifter, capable of doing the many jobs big, expensive heavy duty lift trucks find impractical

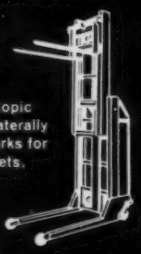
Double telescopic cantilever lifters for extra high lifts.



Straddle model for double faced pallets.



Hinged "Half-Tonner" for low overhead clearance.



Single telescopic model with laterally adjustable forks for stacking pallets.

EASY VERTICAL LIFTING

The heavy duty hydraulic system is actuated by a ¾ horsepower motor, two 130 amp. batteries with built-in 10 amp. charger (standard equipment) or AC-DC line power supply. Designed to 15¾" for very narrow aisle operation. Oversize 8" swivel ball bearing casters and large 5" roller bearing wheels provide easy rolling.

Colson's Standard Features

- **extra height—lifts 68¾"**
- **double safety—two heavy duty load bearing chains, each will support full load. Extra rugged construction**
- **side thrust rollers to prevent platform tipping**
- **ball bearing load rollers on platform**
- **safety floor lock**
- **push button control (optional)**

Over 50 standard lifters and capacities . . . and custom built lifters . . . meet any requirement. Consult a Colson materials handling specialist.

Colson®

CONVEYOR
Aluminum or steel skate wheel or roller gravity conveyor

LIFT JACK TRUCK
No. 6712

DRUM HANDLING TRUCK
No. 6055

IN LINE TRUCK
No. 7010

SMOOTH HORIZONTAL ROLLING

No. 6-807-195

No. 4-1037

CASTERS No. 6-808-17

Write or phone for recommendation by specialists

The Colson Corporation · General Offices, **Elyria, Ohio**

Factories in Elyria, Boston, Toronto

See us at the Plant Maintenance & Engineering Show, Jan. 28-31, Booth 1108, Cleveland, Ohio

For more facts circle 553 on Reply Card

if it can be pushed through a pipe . . .

you can pump it with a

MOYNO®

No doubt, in your plant, certain materials are being moved by hand expensively that could be pumped economically by a Moyno. They pump anything that can be forced through a pipe . . . from very thin liquids to heavy, non-pourable abrasive substances . . . even materials containing suspended particles! As the illustration shows, progressing cavities, formed by the helical screw-like rotor turning inside the double-helical stator, move smoothly along, carrying the material with them . . . the cavities don't squeeze the substance . . . can't stick or gum up. Moyno pumps will not cause churning, foaming . . . won't aerate or vapor-lock!

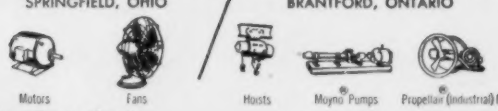
Moynos are adaptable for a wide range of substances simply by modifying the materials the pumping elements are made of. They are available to pull up to 29" of vacuum while discharging under pressure. If you have a pumping problem, chances are a Moyno will solve it!

Write today, for Bulletin 50 PE or look in the yellow pages for name of your nearest R & M Moyno pump representative.

Industrial type Moyno . . . available to 500 gpm, pressures to 1000 psi.

ROBBINS & MYERS, INC.

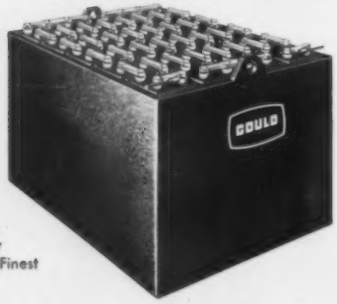
SPRINGFIELD, OHIO | BRANTFORD, ONTARIO



Motors · Fans · Hoists · Moyno® Pumps · Propellair® (Industrial) Fans

For more facts circle 554 on Reply Card

LEAP ... but not before you look at Gould's "extra-value" features:



Gould
Industrial
Truck Battery
—America's Finest

More Aggressive Research Program
More Application Engineering Help
More and Better Battery Performance

You'll agree, the leap to Gould smooths out all battery problems. Be sure to specify Gould. Gould-National Batteries, Inc., Trenton 7, N.J.

Always Use Gould-National Automobile and Truck Batteries

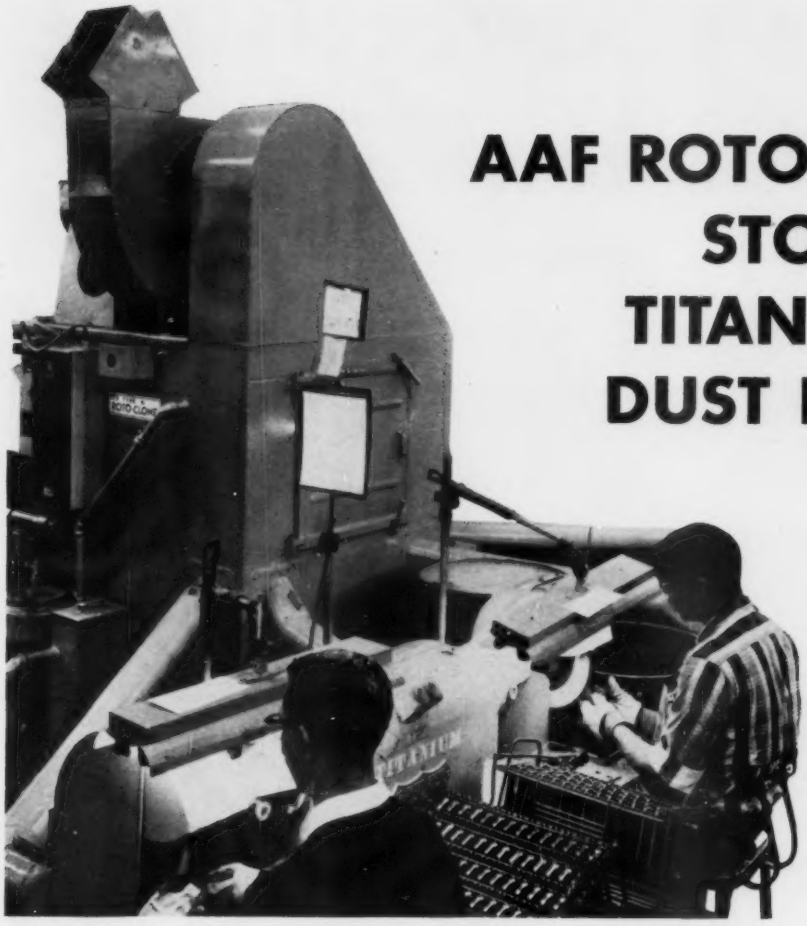
gould
BATTERIES

More Power to you from Gould

©1956 Gould-National Batteries, Inc.

For more facts circle 555 on Reply Card

AAF ROTO-CLONES STOP TITANIUM DUST FIRES

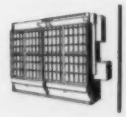


This AAF Type N ROTO-CLONE stands as a sentinel of safety as workers buff titanium parts.

Wet-collecting Type N ROTO-CLONES take the danger out of titanium buffing

A small spark can quickly ignite titanium dust, and spread a flash fire to dust in ducts and bins. Those dust control systems attached to polishing and buffing operations can be major offenders. The answer to these titanium dust producers is wet-collecting AAF ROTO-CLONES. The top "fireman" is the rugged Type N ROTO-CLONE. The high cleaning efficiency (and inherent safety) of this hydrostatic precipitator is the result of the combined action of centrifugal force and the thorough intermixing of water and dust-laden air.

Solving "new" dust problems like this one is nothing new for AAF. We've been doing it for more than a quarter-century and it has led to the development of industry's most complete line of equipment. For more data on the Type N ROTO-CLONE, call your nearest AAF representative or write direct for Bulletin 277.



Air Filters and Precipitators

Illinois Heating Specialties

AAF American Air Filter COMPANY, INC.

228 Central Avenue, Louisville 8, Kentucky
American Air Filter of Canada, Ltd., Montreal, P. Q.

BETTER AIR IS OUR BUSINESS

Herman Nelson Unit Heaters

Herman Nelson Portable Heaters

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SKYLINE ADVERTISING

. . . a *PLUS* value with HORTON ELEVATED TANKS

Dependable gravity pressure water storage is the primary function of a Horton® elevated tank. It provides a private water supply that is available day or night for fire protection and other needs. But here is a PLUS value—the use of these attractive tanks to promote your company name or a replica of your product. Towering above the surrounding area, this valuable "skyline" advertising is a constant reminder of your modern, progressive plant and its products.

Chicago Bridge & Iron Company has complete facilities to create elevated tanks of standard or unique design . . . structures that are functional as well as decorative to meet *your* requirements. Complete information on Horton elevated tanks may be obtained by writing our nearest office.

Left: 100,000-gal. Horton ellipsoidal-bottom elevated tank built for Universal Oil Products Company at Des Plaines, Ill.

Center: 75,000-gal. special elevated tank built for Gerber Products, Inc., at Rochester, N. Y.

Right: 100,000-gal. Horton Watersphere® built for the Rubatex Division of Great American Industries, Inc., at Bedford, Virginia.

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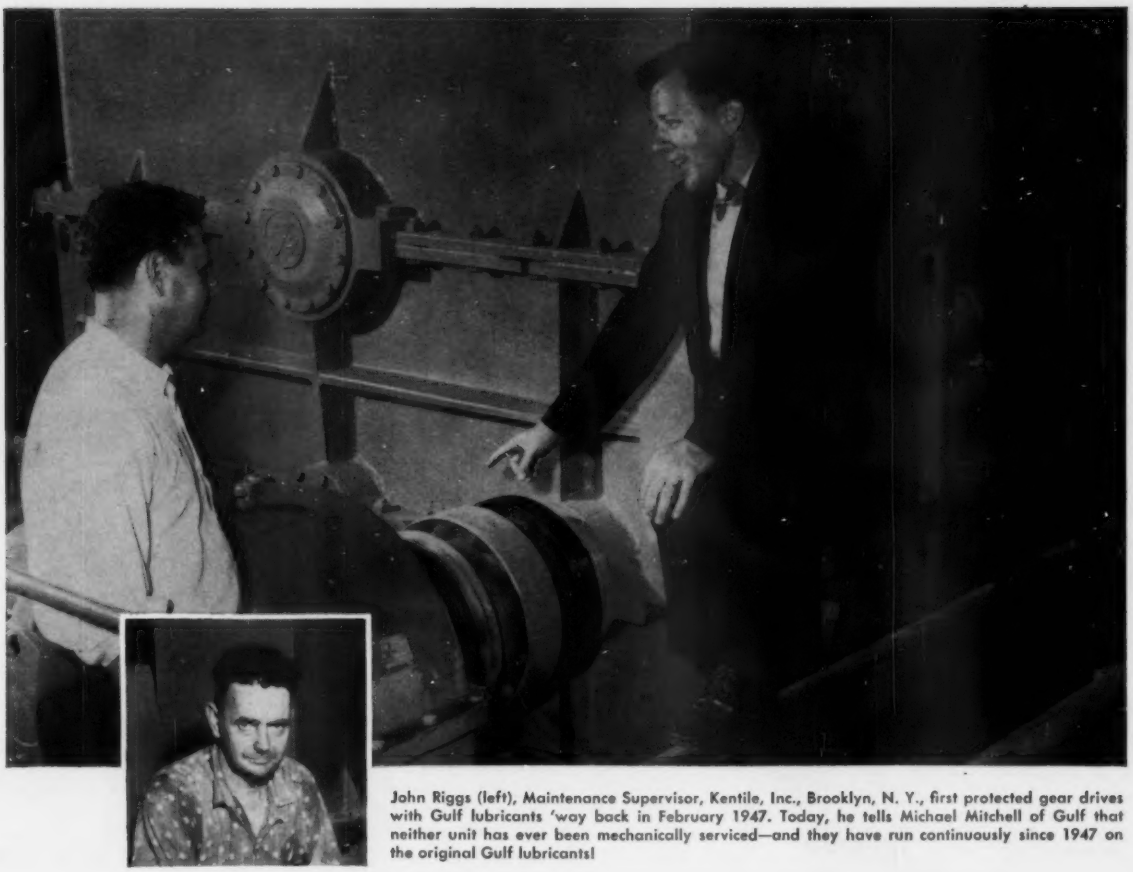
Plants in BIRMINGHAM, CHICAGO, SALT LAKE CITY and GREENVILLE, PA.



John Riggs (left), Maintenance Supervisor, Kentile, Inc., Brooklyn, N. Y., first protected gear drives with Gulf lubricants 'way back in February 1947. Today, he tells Michael Mitchell of Gulf that neither unit has ever been mechanically serviced—and they have run continuously since 1947 on the original Gulf lubricants!

"Our gears have run for 74,000 hours ... on the original Gulf lubricants!"

says John Riggs, Maintenance Supervisor of Kentile, Inc.

Three shifts a day, six days a week, since February, 1947! To Kentile, Inc., Brooklyn, N.Y., that's the equivalent of 27 years of ordinary service. And that's how their gear drives have operated—protected by Gulf quality lubricants.

These drives transmit power for calendering asphalt tile. Their multiple herringbone gears have been lubricated by *the same* Gulf E. P. Lubricant 115 for the past ten years—nor do they see any need for changing today.

Your Gulf Sales Engineer will be glad to help *you* cut costs, too. He's at your nearest Gulf office.

GULF OIL CORPORATION
GULF REFINING COMPANY
1822 Gulf Building
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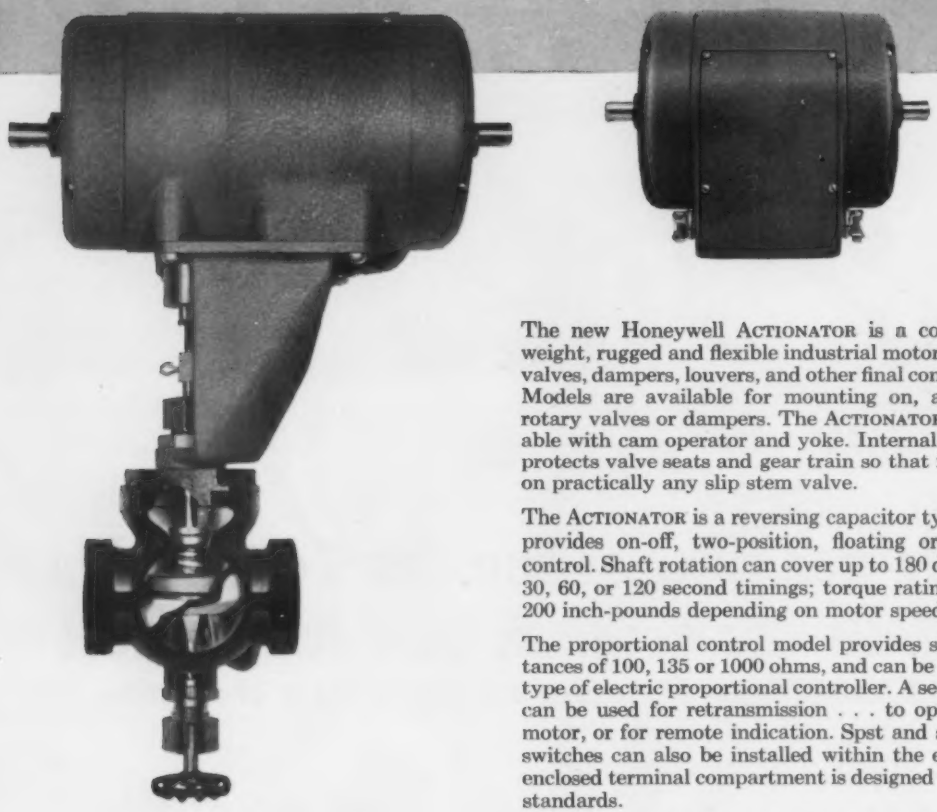
NEW ACTIONATOR*

heavy duty electric motor for operating valves, dampers, louvers



The new Honeywell ACTIONATOR is a compact, lightweight, rugged and flexible industrial motor for operating valves, dampers, louvers, and other final control elements. Models are available for mounting on, and operating rotary valves or dampers. The ACTIONATOR is also available with cam operator and yoke. Internal strain release protects valve seats and gear train so that it can be used on practically any slip stem valve.

The ACTIONATOR is a reversing capacitor type motor and provides on-off, two-position, floating or proportional control. Shaft rotation can cover up to 180 degrees in 7½, 30, 60, or 120 second timings; torque ratings from 50 to 200 inch-pounds depending on motor speed.

The proportional control model provides slidewire resistances of 100, 135 or 1000 ohms, and can be used with any type of electric proportional controller. A second slidewire can be used for retransmission . . . to operate another motor, or for remote indication. Spst and spdt auxiliary switches can also be installed within the end bells. The enclosed terminal compartment is designed to meet J.I.C. standards.

Limit and auxiliary switches, specially designed by MICRO SWITCH, allow the ACTIONATOR to be used where ambient temperatures range from −20 to +150 F.

For complete information and specifications on the new ACTIONATOR, call the nearest Honeywell office, or write (send coupon) to:

MINNEAPOLIS-HONEYWELL REGULATOR CO., *Industrial Division*, Wayne and Windrim Avenues, Phila. 44, Pa.

Industrial Division
MINNEAPOLIS-HONEYWELL REGULATOR CO.
Wayne and Windrim Avenues, Philadelphia 44, Pa.

☐ Please send me additional information on the ACTIONATOR.

☐ I'd like a Honeywell sales engineer to discuss applications of the ACTIONATOR in my plant.

Name_____

Title_____

Company_____

Address_____

MINNEAPOLIS **Honeywell**

First in Controls

*Tradename Minneapolis-Honeywell Regulator Co.

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CONSTRUCTION BRIEFS — a review of fundamentals for the plant engineer

Prepared by B. A. Wasil, Structural Engineer

DESIGN OF A TRUSSED ROOF PART I

SINCE THIS is the first Brief that will concern itself with a step by step approach to the design of a structural assembly, it will be wise to start with a discussion of the principles of design.

Design can ordinarily be divided into four categories:

1. Determination of loads.
2. Analysis of structure.
3. Proportioning of the individual parts of the structure.
4. Assembling of the structure.

1. Loads. Loads may be classified as either gravity or lateral loads. Under gravity loads we have first the dead load, which is the weight of structure and all the permanent appurtenances to the structure. This will include the structure itself, flooring or roofing material, partitions, hung ceilings, etc. Live load is also gravity load. Live load is superimposed vertical load; it may be a moving load or it may cover the entire area or any portion of the area as a uniform load. The live load is ordinarily placed to give the worst condition for design. Live loads would probably be the most heavily loaded truck for a highway or highway bridge, the most extreme depth of snow for a roof, largest number of people and pieces of furniture for a residential structure, etc.

Included in the classification of lateral loads would be wind, earthquake, soil and water.

Each municipal building code makes stipulation as to magnitude of the live loads and lateral loads. This will vary from city to city, depending largely upon the climatic conditions for snow and wind loads and also upon the seismic charts for earthquake loads.

2. Analysis. The determination of the total stresses for each member of a truss and the moments, shear and thrusts for beams and columns are included in this step. The problems of analysis of simple structures have been included in the previous Briefs on mechanics and strength of materials.

3. Proportioning. This step involves the selection of the size and shape of the structural element such that the member will safely resist the total stresses, moments, shear and thrusts determined in the analysis. The problems involved in proportioning were shown in previous Briefs.

4. Assembly. This step has been discussed in part in the Briefs on structural connections. However, assembly involves not only connections but the entire ideas involved in framing and can only be discussed in reference to the particular system.

Figure 1 shows plans and sections for a proposed truss roof. The bracings are provided to insure a stable frame against movement in any direction. Designers may call for diagonal bracing on the face of the top chord where they feel the purlin-to-truss connections are not positive enough to create a rigid frame. In addition, designers may make a truss with the strut as a bottom chord and the purlin above it as the top chord to prevent instability in a longitudinal direction.

The span of the truss is, of course, governed by the ultimate use of the building. The height is determined for economy. For the best economy of a gable type truss, the rise should be about ¼ of the span. In order to prevent bending in the top chord the panel points are located directly below the purlins. The purlin spacing and thus the panel points are governed by the capacity of the roofing slab.

The sag rods are used to give additional support to the purlins in resisting the tangential component of the load on the weak axis of the member.

The design will include:

a) Typical Purlin
b) Ridge Purlin
c) Sag rods
d) Truss
e) Bracing
f) Strut

It has been found that for roofs of pitch less than 30 degrees, wind creates only suction upon the roof. Since suction will reduce the snow and dead loads, wind naturally will not be considered in the design. It should, however, be determined that the wind suction be smaller than the dead load.

Design of Typical Purlin

1. Loads

Sloping width handled by each purlin $= \frac{\sqrt{10^2 + 20^2}}{4} = 5.6$ ft.

Horizontal projection handled by each purlin $= \frac{20}{4} = 5.0$ ft

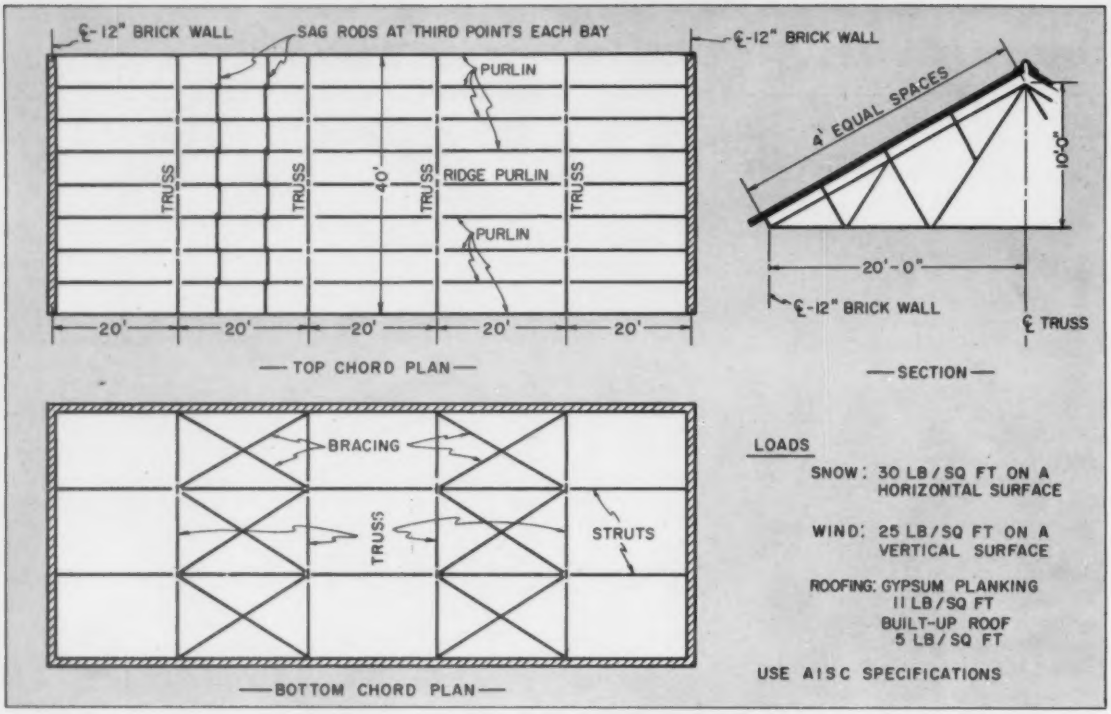
Dead load =

Gypsum plank 11.0 × 5.6 =	61.6 lb/ft
Roofing material 5.0 × 5.6 =	28.0 lb/ft
Estimated weight of purlin =	20.0 lb/ft
	109.6 lb/ft

Table taken from AISC Handbook of weights of some "dead load" materials

Materials	Weight Lb. per Sq. Ft.
CEILINGS	
Gypsum ceiling block, 2" thick, unplastered	10
Plaster board, unplastered	3
Plaster, ¾", and wood lath	8
Plaster, ¾", and metal lath	8
Plaster, on tile or concrete	5
Suspended, metal lath and plaster	10
FLOORS	
Hardwood flooring, ⅞" thick	4
Sheathing, white, red and Oregon pine, spruce or hemlock, ⅞" thick	2½
Sheathing, yellow pine, 1" thick	4
Wood block, creosoted, 3" thick	15
Cement finish, per inch thick	12
Cinder concrete, per inch thick	9
Cinder concrete fill, per inch thick	5
Terrazzo, Tile, Mastic, Linoleum, per inch thick, including base	12
Gypsum slab, per inch thick	5
ROOFS	
Roofing felt, 3 ply and gravel	5½
Roofing felt, 5 ply and gravel	6½
Roofing felt, 3 ply and slag	4½
Roofing felt, 5 ply and slag	5½
3-ply ready roofing	1
Shingles, wood	2

Materials	Weight Lb. per Sq. Ft.
PARTITIONS	
Channel studs, metal lath, cement plaster, solid, 2" thick	20
Studs, 2" x 4", wood or metal lath, ¾" plaster both sides	18
Studs, 2" x 4" plaster board, ½" plaster both sides	18
Hollow clay tile, 2"	13
Hollow clay tile, 3"	16
Hollow clay tile, 4"	18
Hollow clay tile, 5"	20
Hollow clay tile, 6"	25
Hollow clay tile, 8"	30
Hollow clay tile, 10"	35
Hollow gypsum block, 3"	10
Hollow gypsum block, 4"	13
Hollow gypsum block, 5"	15½
Hollow gypsum block, 6"	16½
Solid gypsum block, 2"	9½
Solid gypsum block, 3"	13
Steel partitions	4
WALLS	
Brick, 9" thick	84
Brick, 13" thick	121
Brick, 18" thick	168
Wall tile, 6" thick	30
Wall tile, 8" thick	33
Wall tile, 10" thick	40
Wall tile, 12" thick	45
Brick 4", tile backing 4"	60
Brick 4", tile backing 8"	75
Limestone 4", brick 9"	140
Limestone 4", brick 13"	175



Plan and section drawings of a proposed roof truss. Design calculations for solution are covered in accompanying text

Live load =
$30 \times 5 = 150$ lb/ft
Total load =
$109.6 + 150 = 259.6$ lb/ft
Angle of roof slope =

$$\tan^{-1} \frac{10}{20} = 26°35'$$

Normal load =
$259.6 \cos 26°35' = 232$ lb/ft
Tangential load =
$259.6 \sin 26°35' = 116$ lb/ft

2. Moments

Moment due to normal loading, supported at ends
$M_n = 1/8 \times 232 \times 20^2 = 11{,}600$ ft/lb

Moment due to tangential moment supported at ends and third points
From page 383 AISC Manual
$M_t = .0111 \times 116 \times 20^2 = 515$ ft/lb

It is assumed that for normal loading the purlin is supported against lateral buckling at the ends and at the third points. For tangential load it is assumed that the web of the purlin provides continuous support against lateral buckling.

Therefore for normal loading the allowable compression stress is determined by the formula:

$$F_a^N = \frac{12{,}000{,}000}{\frac{ld}{bt}}$$

but not greater than 20,000 psi

Where l = unsupported length
d = depth of member
b = width of compression flange
t = thickness of compression flange

Since l is considered zero for the tangential loading, $f_a^N = 20{,}000$ psi.

If F_a^N is the actual compression stress for loading in the normal direction and F_a^T the actual compression stress for loading in the tangential direction, then

$$\frac{F_A^N}{f_a^N} + \frac{F_A^T}{f_a^T} < 1$$

Try a 10-in., 15.3 lb channel

$$F_A^N = \frac{11{,}600 \times 12}{13.4} = 10{,}400 \text{ psi}$$

$$F_A^T = \frac{515 \times 12}{1.2} = 5{,}150 \text{ psi}$$

$$f_a^N = \frac{12{,}000{,}000}{\frac{20 \times 12 \times 10}{3 \times 2.6 \times .436}} = 17{,}000 \text{ psi}$$

$f_a^T = 20{,}000$ psi,

Therefore:

$$\frac{F_A^N}{f_a^N} + \frac{F_A^T}{f_a^T} =$$

$$\frac{10{,}400}{17{,}000} + \frac{5150}{20{,}000} = .87$$

Since $.87 < 1.0$, section is suitable for this application.

Design of Ridge Purlin

It is usual to provide an I-beam of the same depth as the channel purlin for the ridge purlin. Since the smallest 10-in. I-beam (10 I 25.4) has a section modulus in the strong direction larger than the channel used for the typical purlin (above) and also since the ridge purlin will only be subjected to normal loads, then this member will be satisfactory.

Design of Sag Rods

Sag rods are designed to take the reaction of the tangential load of the purlins. Each purlin adds to the reaction on the sag rod, thus the sag rod joining the ridge purlin with its adjacent purlin is the most heavily loaded rod. All rods will be designed for this load.

The reaction of the purlin can be found to be:

$$R = \frac{116 \times 20}{3} \times \frac{17}{16} = 822 \text{ lb}$$

For 3½-in. purlins,
$R = 3.5 \times 822 = 2880$ lb

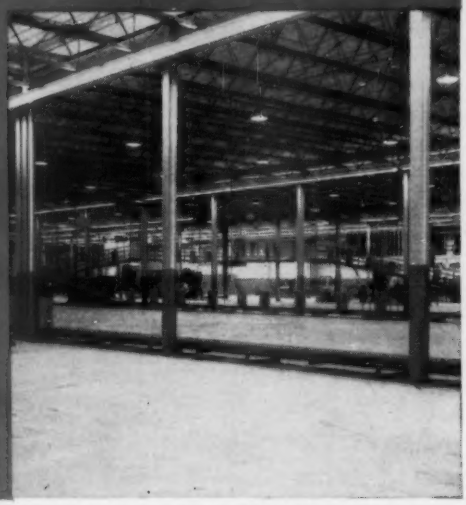
$$\text{Req'd } A_{net} = \frac{2880}{20{,}000} = 0.144 \text{ sq in.}$$

Therefore, use ⅝-in. diameter rods, which have a net root area of 0.202 sq in.

(Part 2 will continue this design)

Boydell Aluminum Paint helps Continental Can Company keep this new plant clean

Aluminum-painted walls and steel structurals reflect light without glare, lend bright, cheerful atmosphere to the plant interior. Working conditions are more comfortable and pleasant.



Aluminum paint does good public relations job for Continental Can Company's new Fiber Drum Plant, Midland, Michigan. Aluminum Paint: **Boydell Bros. Co., Detroit.**

Company policy specifies aluminum paint for all plants since 1936

This new Continental Can Company plant produces fiber drums used for a wide variety of chemical, drug and food products. High standards of cleanliness must be maintained at all times. After 20 years' experience, this company finds aluminum paint is still best for keeping plant interiors clean . . . has made it a company policy to paint all plants with aluminum.

"Aluminum paint has a clean, pleasant appearance and looks sanitary," reports a company official. And because aluminum paint is more durable than other paints, it can stand up longer against frequent washing and vacuuming. In fact, Continental expects at least ten years of service from the aluminum paint on this new plant.

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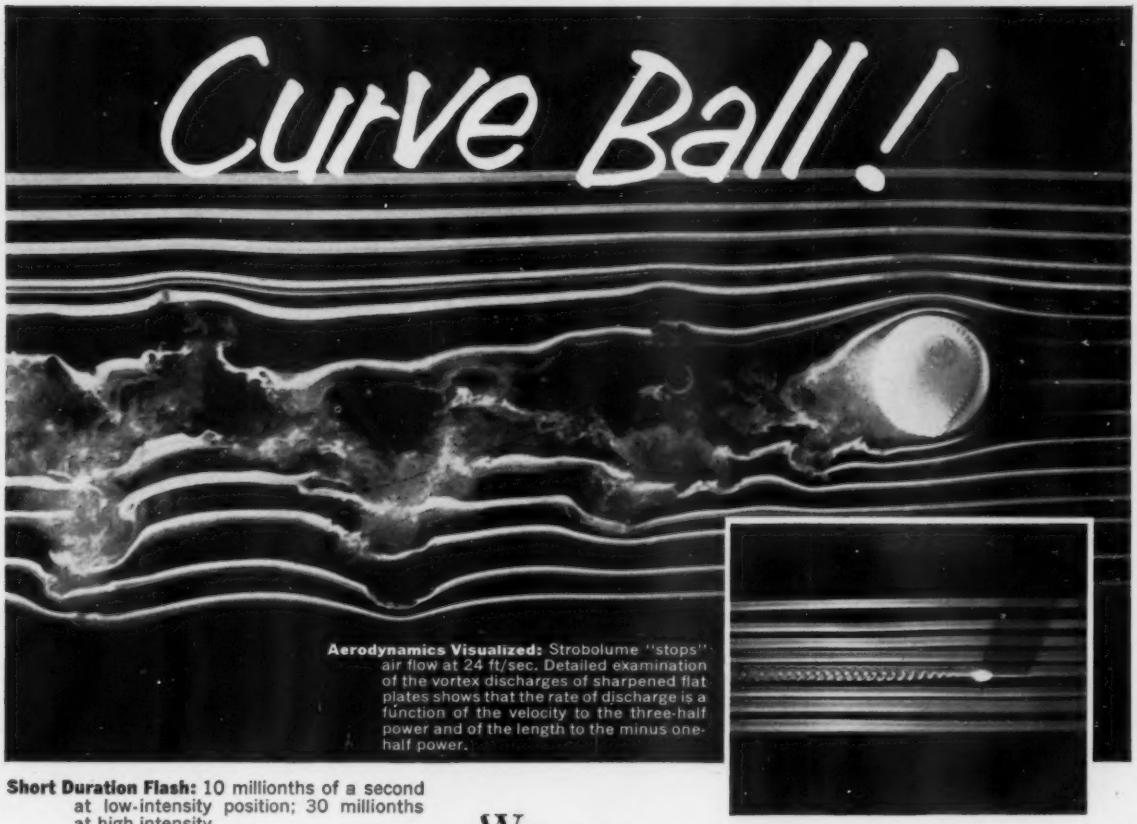

Aerodynamics Visualized: Strobolume "stops" air flow at 24 ft/sec. Detailed examination of the vortex discharges of sharpened flat plates shows that the rate of discharge is a function of the velocity to the three-half power and of the length to the minus one-half power.

Short Duration Flash: 10 millionths of a second at low-intensity position; 30 millionths at high intensity.

Light Intensity: eight million beam candles, 400 times that of ordinary stroboscope.

Speed Range: up to 3000 flashes per minute; 1200 per minute, maximum, on high-intensity flash.

Ease of Operation: light source is simply aimed at subject; because there is no physical connection between stroboscope and object under study, there can be no instrument effect on operation.

Removal Lamp Housing: lamp may be used at end of 14-foot cable to reach otherwise inaccessible places.

Versatility: can be synchronized with any simple make-break device, or controlled by G-R Type 631-BL Strobotac or Type 1535-B Contactor; push button provided for manual flashing.

Compactness: 7½" x 13" x 11"; 18½ lbs. over-all; lamp assembly only 2 lbs.

Type 1532-B Strobolume $275.

What effect do the seams of a baseball have on its wake and on its path of travel? The answer: wake effects are very small — and, seams actually improve path stability, aiding the pitcher's control. To determine this, Professor F. N. M. Brown, of the University of Notre Dame, photographed first a speeding baseball and then a perfectly smooth sphere with the aid of high-intensity, short-duration light flashes produced by General Radio stroboscopic equipment.

The ball was photographed in a small wind tunnel filled with smoke streamers to make the air flow visible. Photographs were taken with a standard Graphic View camera which was synchronized with three G-R Strobolumes to provide an intense white light with exposure time of 20 microseconds.

Studies conducted with the "visualization" technique described here have established many aerodynamic facts. (See inset photograph above.) The Strobolume's ability to "stop" rapidly moving objects has proven of great value to researchers such as Professor Brown. Others, engaged in a variety of development and research programs, have benefited as well.

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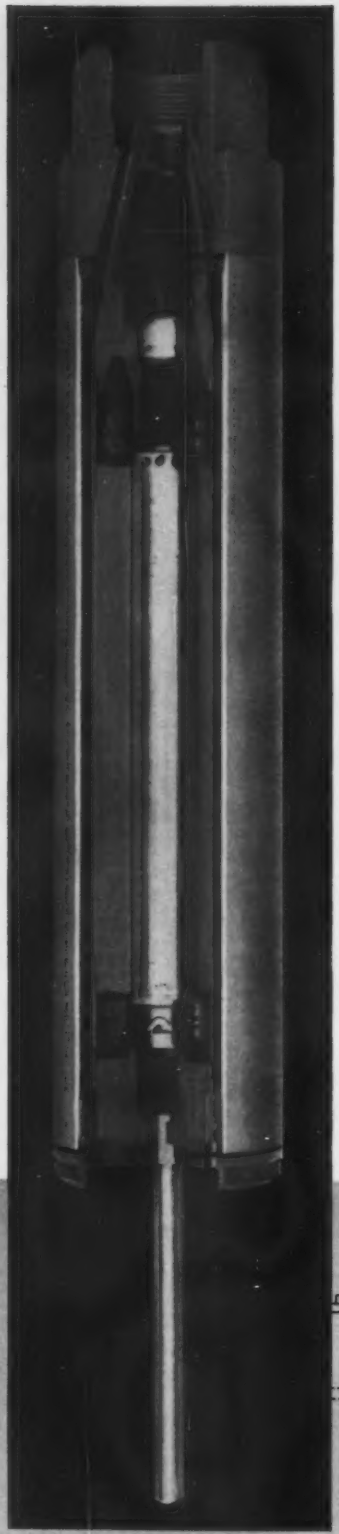

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2. Extruded aluminum outer shell becomes main structural member – ribbed design provides much needed rigidity.
3. 5/16" chrome-steel shaft extension provides greater strength–prevents mechanical distortion.
4. Increased annular area allows 10% greater gasoline flow – minimizes trouble-making back pressure and turbulence.
5. Suction stub mounts without adaptor castings – reduces expense required with other motors.
6. Plastic-impregnated windings surpass wet-design insulation requirements – remain trouble-free for extra-long service life.
7. Leland's integrated motor design permits complete removal of pump or stub *without* disassembling motor.

In addition . . . a remote-control box is supplied with each Leland submersible pump motor. Includes thermal overload protector, line control and starting relays, starting and running capacitors.

30 years ago Leland developed the first gasoline curb pump motor to receive U.L. Approval – today, Leland gasoline pump motors outsell all others combined. So there's good reason why, for explosion-proof motors of any kind, your best bet is Leland. If you would like more information, and/or a copy of a new brochure on the submersible motor, write, wire or phone us – TODAY!

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THE LELAND ELECTRIC COMPANY
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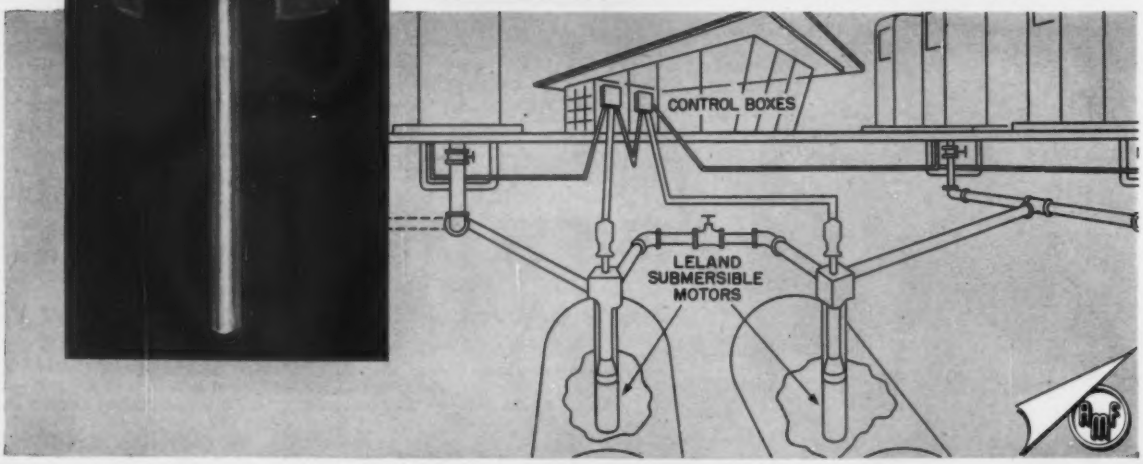

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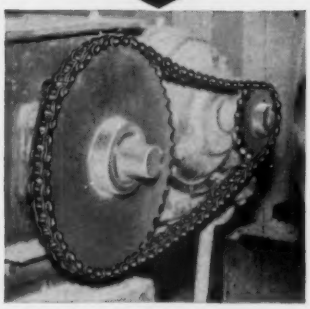

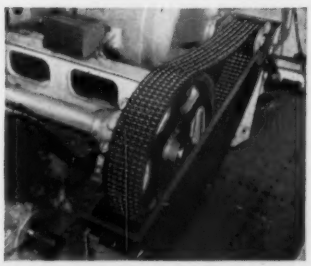

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- High-CO_2 and low-temperature stack gases — proof of high combustion efficiency.
- Free, rapid water circulation improves heat transfer, keeps heating surfaces clean.
- Easy access to furnace and all return tubes. Refractory baffles and brickwork are not required.

For details on the Continental Automatic Boiler, send for Bulletin BE-3

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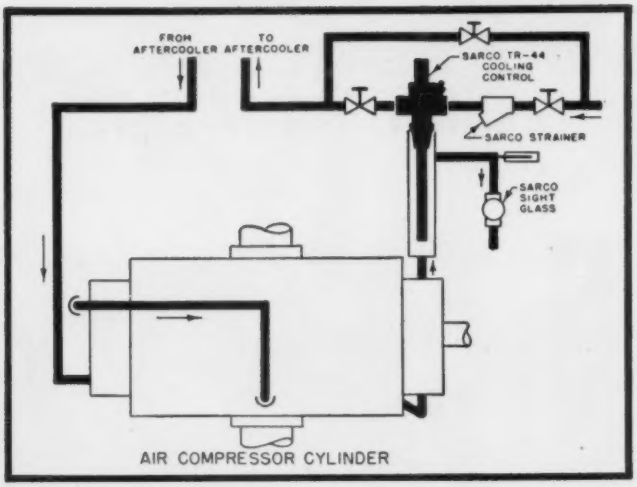

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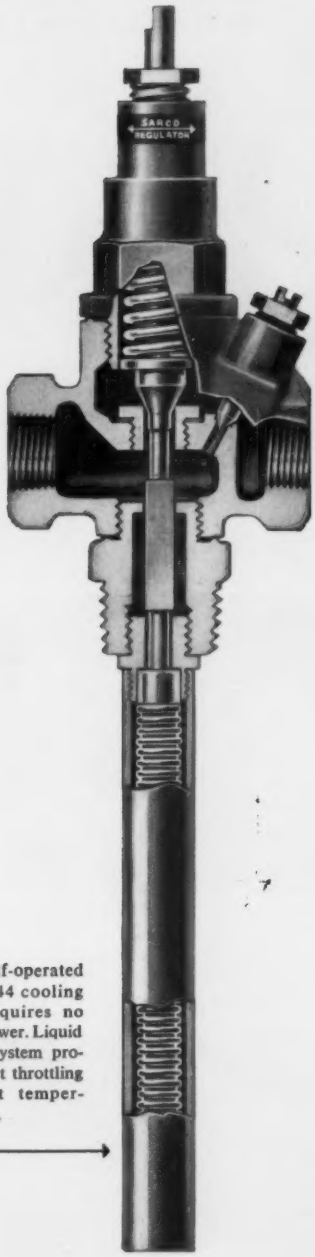

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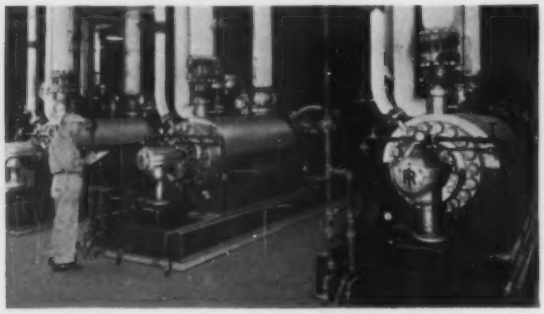

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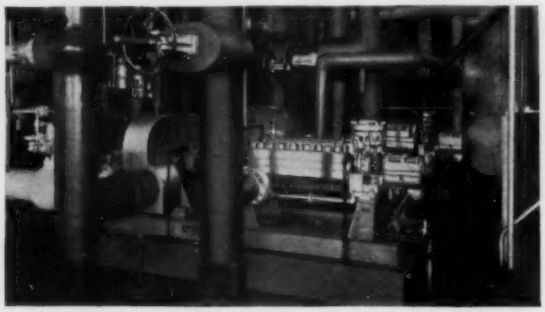

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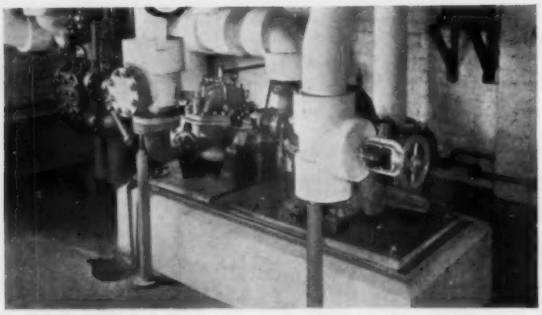

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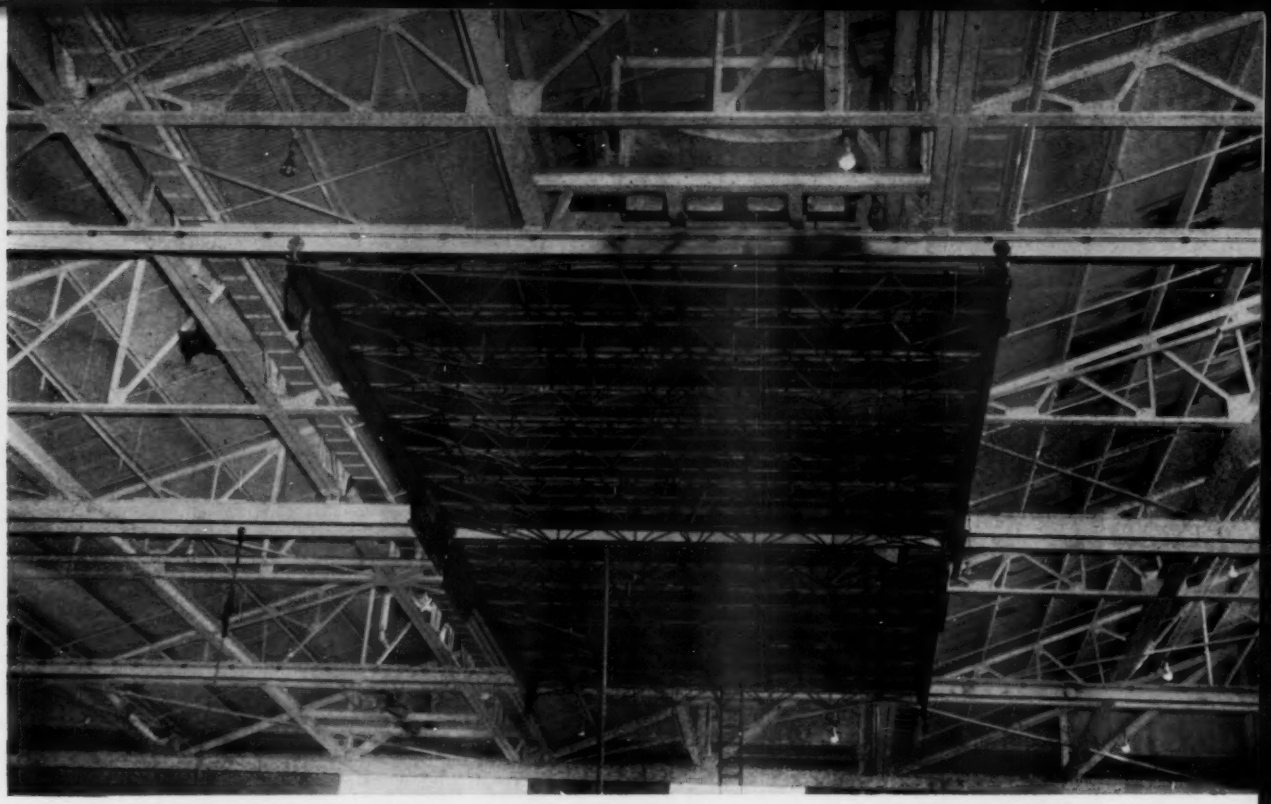


Above: This view shows how painters' platform rides monorail. Below: Painters get to platform by way of mobile ladder

A Planned Plant Painting Program

"Non-Stop" Schedule Gives Lower Costs, Cuts Clean-up

This Is What Convair Has Gained from Its New Painting Program:

1. *Cut Maintenance Costs*
2. *Eliminated Production Interference*
3. *Slashed Costs of Overspray Cleanup*
4. *Eliminated Repainting*
5. *Encouraged Shortcut Methods, Equipment*
6. *Kept Small Painter Crew Employed*

BEHIND CONVAIR-SAN DIEGO's "non-stop" painting program lie some lessons for plant engineers everywhere.

By "non-stop," Convair means continuous—an 8-year painting cycle for plant exteriors, a 5-year cycle for interiors with the work assigned to a 28-man, highly-skilled crew.

Adopted last year, "non-stop" painting will: 1. cut maintenance costs; 2. eliminate production downtime; 3. spread painting costs over the paint's predictable life-span; 4. mean a better

Painters at work high above floor. Only for relatively high roof areas must even short ladders be used

looking, cleaner place in which to work.

Basis for the program were four years of research and a debate. Research involved tests for weathering, fading and overspray, the sampling of scores of paint types and brands. The debate, common to many a plant, was simply this: is it more economical to paint all at once, on a "crash" basis, or continuously a little bit of the plant at a time?

"Analysis showed continuous painting most efficient," says Convair's J. W. Vint, Superintendent of Maintenance.

Why? For one thing, the scheduled, long-run program aims at eliminating "redoitis"—a chronic plant affliction. Often painters are no sooner finished than plumbers and electricians come in —rewire and repipe, necessitating a repainting. Long-range planning can avoid this by simple industrial logistics; getting the right men with the right equipment to the right place at the right time.

Get Cost Figure, Too

Long-range scheduling can accomplish even more. For the first time, Convair will have in hand detailed breakdowns of cost. They will know exactly what it costs to paint specific sections of the plant, the time involved, the labor materials expended. And, by sending in electricians and plumbers to tear out old, unused piping and conduiting on the first go-around, the second painting cycle should scale costs way down.

Convair's non-stop program coordinates, from the plant engineer's office, all maintenance crews. The rule: plumbers and electricians in first. And after them, the painters.

Importantly, non-stop painting inspires deep probing research (into what paint is best for what); and encourages shortcuts (Convair's unique high-bay platform, where painters work in complete safety without interrupting production).

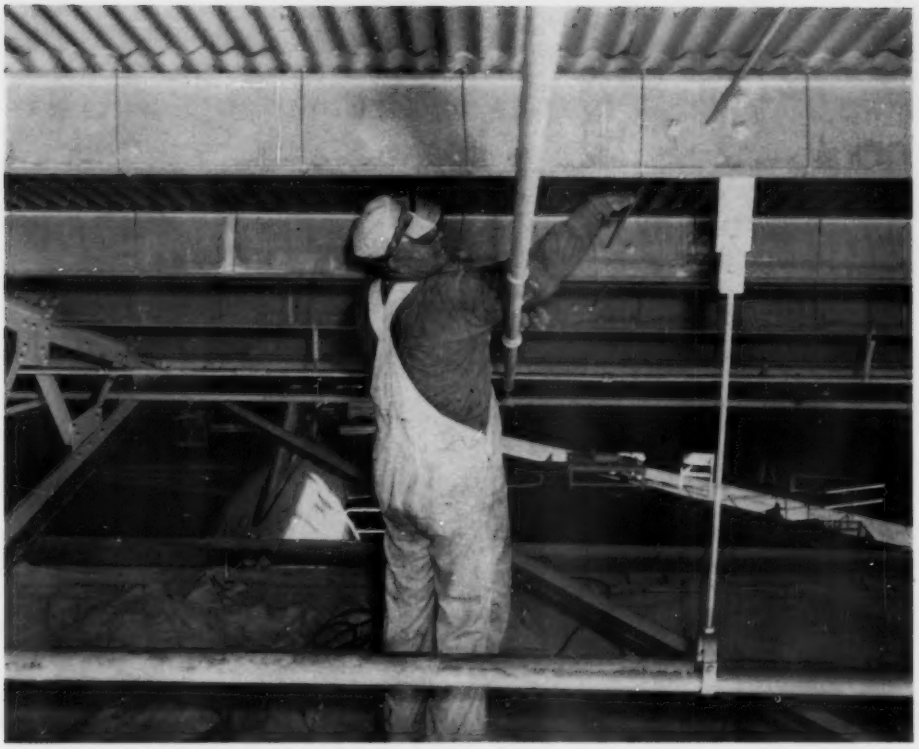
For the first time, then, Convair has put painting on the same precise schedule as machine maintenance and lubrication.

Let's draw sharper focus, for Convair's is likely among the best long-term painting programs operating in any plant, anywhere. The following sections will show why this belief is probably well founded.

1. Convair Keeps Nucleus of Skilled Painters Steadily Employed

A SMALL CREW allows Convair to outfit each man with the best of spray-painting equipment. It also encourages specialization among painters—up to a point. Convair has found, for example, that to hand one painter all the dirty work—scraping —isn't desirable. Better idea is to rotate the scraping job (all jobs, for that matter) among the crew. At one time, too, it was suggested that for scraping, the plant engineering department might save money assigning the job to less skilled, lower paid men.

"In theory," admits Superintendent Vint, "it would seem that assigning a utility man to scraping might save the company money. Actually, it doesn't. And mainly because the fellow scraping must also be a fellow who, tomorrow, could be wielding a spray-gun or brush. A guy scrapes more carefully and does a better job when in the back of his mind lurks the chance that he'll be painting over the surface he's now cleaning. So scraping, painting, clean-up and similar jobs fall to our painting crew."



Working atop platform the painter needs no ladder to reach underroof areas and he's safe, too

2. Overspray Control

IF U. S. INDUSTRY added up its overspray clean-up bill, the figures would stagger even the most complacent. Trouble is, when painting is but a minor segment of plant engineering, or when it's hit-and-miss, engineering doesn't take time to study the overspray problem, and correct it. Convair, planning years ahead, did.

Some Convair findings showed that overspray clean-up was excessive, particularly using some aluminum and water based paints. Overspray clean-up sometimes equalled painting time. Occasionally, precision tools and equipment were all but ruined, splotched from overspray. At the very least, overspray clean-up cost 25 per cent of the total paint job! Convair did some research. Plant engineers ran consistency tests to check extent and travel of overspray and what pigments caused most trouble. *Conclusion:* pigments in plastic vehicles were less vulnerable to overspray than oil based paints. In testing, engineers laid panes of glass varying distances from spray operations—to check travel of overspray. *Solution:* Convair has standardized, for both exterior-interior, on a polyvinyl acetate paint which shows minimum overspray, yet guarantees maximum wear.

3. Paint Test Program Aids Selection

NEITHER CONVAIR NOR any other plant can schedule a long-range program, with any accuracy, unless it knows paint life and probable fading. Much depends where a plant is located, the weather and atmospheric conditions. In Convair's case, located as it is near the Pacific, the plant is subject to salt spray. Summertime temperatures may reach 110 degrees at noon, drop to 60 or 70 degrees by midnight. Condensation on the plant's galvanized saw-tooth roof is considerable.

Convair maintenance engineers ran their own paint tests, to see how paints stood up under local conditions. Emphasis was on "local" as it should be for your plant. For almost everywhere are conditions peculiar to an area.

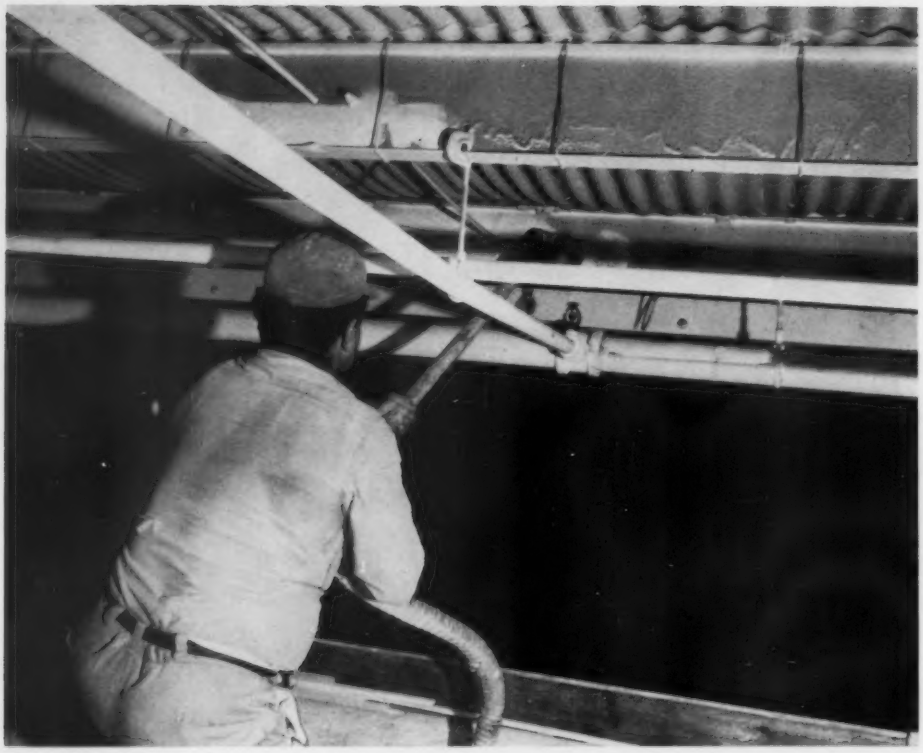
Tests proved the polyvinyl-type paint best. Life was longer, the peeling, oxidation and fading less.

4. How To Eliminate Production Downtime

IN MOST PLANTS THE arrival of painting crews is viewed both as a blessing and a bother. Every department head wants a clean, newly painted shop. But painting too often means production downtime. And it's production that's of first importance, not the painting.

Convair, for example, used to rig nets and drop-cloths over machines, rope off production areas, tie up machines. Result: critical line stoppages. Also, net and drop-cloth placing was costly. On the average, six men worked six hours to hoist and tie a sectional net before the painters could set to work. Removal was almost as time consuming.

All this was before Maintenance Superintendent Vint came up with what is likely the decade's best answer to high-bay painting. His shop-fabricated innovation: three totally enclosed, monorail-riding platforms, each 27 by 27 ft, and working some 35 ft off the paint floor. Painters work atop the platforms, out of production's way. Tarps close them in, thwart overspray. From the platforms, painters can reach fully half the roof's underside without ladders. When ladders are needed they're low—only 6 ft high. Air for sprayers is piped to the



Air and vacuum are supplied to the mobile platform. Here painter is shown cleaning underroof area

monorail-riding platforms. Two men can handle each of the eight 26-ft by 3½-ft trussed plywood sections which comprise a platform. Sections are trussed with ¾- and ½-in. EMT, and were tested for 1000-lb loading.

Four men, working with a crane, can position all three platforms in about six hours. When the platforms need to be moved, they're wheeled down the monorail via a rope that reaches to the production floor. There are no knots to tie (as with tarps); no major moves (platforms merely roll on the monorail); no production shutdowns. As a matter of fact, production workers scarcely know painters, 35 to 40 ft overhead, are at work.

Platforms are specialized. The first, moving ahead of the others, carries scrapers and repairmen. The second carries the painters. The third carries a clean-up crew. This is production line painting in an underroof area which has always posed a big problem for plant engineering.

Scrapers use conventional hand tools — plus some Convair innovations: a scraper fixed to a 4- to 6-ft brush handle, and rigged with an air hose with air at 60 psi. This way, crewmen can reach high areas, loosen with air the hard-to-scrape places. Industrial-type vacuums, working the platform's floor, clean up after the scrapers.

Utility men keep painting crews supplied from the floor below. Painters reach the platforms via a ladder truck.

5. Convair's Long-Range Color Selection Produces Standardization

One outcome of Convair's non-stop program has been to settle, once and for all, on standard colors and a standardized type of paint.

The type: a polyvinyl acetate, the plastic representing 25 per cent of total volume; the vehicle, 75 per cent. It's a thermoplastic film which remains flexible under extreme contraction-expansion. It is non-explosive—so electrical fixtures need not be removed. Tests show that the product fades but little over five years, still gives good protection up to 8 years. This 8-year life is the basis for Convair's painting cycle.

Condensation, particularly in the saw-tooth roof, has little effect upon bond. Condensation bleeds through the plastic film while it's setting up. High temperatures cannot bake out the vehicle, it is reported. One of Convair's big problems has been flaking of high-bay paint.

On the interior, Convair is using what it calls "high-bay green." It's really an off-white, very slightly on the green side. So slight that it's difficult to distinguish from white. Yet, somehow, the color gives a feeling of warmth in winter, of coolness in summer. The finish is egg-shell, neither flat nor high-gloss. High-bay green will cover ceilings and walls to the wainscoting. Below, Convair intends to vary colors, trending toward the darker and brighter tones. On the exterior the plant is bright yellow. Again, the paint is polyvinyl acetate.

Psychology figured in color selection. With the old color scheme (white ceilings, tan walls), workers complained of feeling cold in winter, warm in summer. Plant engineering found that where departments were painted in high-bay green, workers complained less of the heat, less of the cold.

I. Working the Hard-to-Work Metal

Plant Engineers' Primer for In-Plant Application

It includes simple identification tests . . . This first installment covers rolling, bending, punching, machining, riveting . . . Watch for material on welding and heat treating in Part II

By **RICHARD E. PARET**, American Iron and Steel Institute

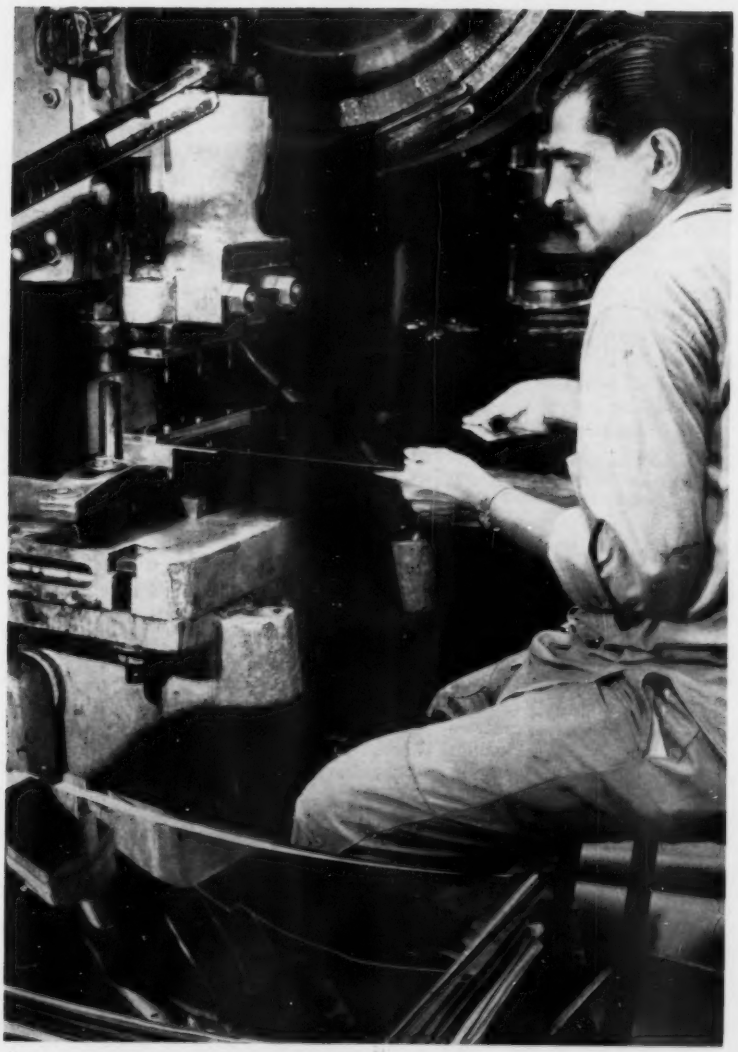


Fig. 1. Stainless steel punching takes more power, less speed than mild steel

USE OF STAINLESS STEEL in plant equipment and construction has increased tremendously in the past years. This increase may be traced through a constant rise in the demands placed on machinery by higher temperatures, pressures, stronger processing and cleaning compounds, and above all, the need for reducing maintenance, down-time, and replacement costs. Thus, it is important for the plant engineer to become more familiar with these modern alloys and their fabrication characteristics.

These metals are distinguished by their extraordinary resistance to heat and corrosion, by their high strength and their ability to withstand abuse. All these qualities give stainless steels a superior durability which makes for economy and long operating life. Thus they are found in innumerable applications in the plant as diverse as valves and piping, vats and pressure vessels, materials handling equipment, ducts and fans, food handling equipment, screens and filters, architectural wall panels—to name a few.

However, many of stainless steel's well-known qualities contribute to some extent to the differences in fabrication technique between these alloys and the less durable metals. For example, stainless steel's high strength and tendency to work harden require greater power in working operations than mild steel. On the other hand this high strength plus its corrosion resistance, may allow the use of a thinner stock of stainless steel, thus reducing the power required.

Any metal has special rules for fabrication. Stainless steels are no exception. Each of the 37 different types of stainless to be described has advantages and limitations for given fabrication processes. The superiority of one type for a particular operation (or se-

ries of operations) is a matter of degree.

When there is an uncertainty about a metal stock, three simple tests will tell whether the metal is non-ferrous alloy or carbon or alloy steel, or whether it is a stainless steel, and furthermore, whether the stainless steel is an austenitic chromium-nickel (the so-called "18-8" types) or a chromium type.

The nitric acid test: A drop of solution consisting of one part nitric acid to one part water is applied to a freshly ground area of the unknown metal. If the acid attacks the metal (indicated by a boiling action of gas evolution) the metal is probably a non-ferrous alloy, a carbon or alloy steel, or an annealed Type 420 or 440 stainless steel. If there is no reaction, the metal may be any of the stainless steels except 420 or 440.

The spark test: Since nitric acid may attack the annealed Type 420 or 440 stainless steels, presence of a short, chromium spark separates these types from nonstainless steels or non-ferrous metals.

The magnet test: Austenitic stainless steels are nonmagnetic when annealed but become slightly magnetic when cold worked. This is easily distinguished from the strong magnetic behavior of the chromium types of stainless steel.

Table I. Stainless Types, and Numbers

Austenitic Types				
201	202	301	302	302B
303	303Se		304	304L
305	308		309	309S
310	310S		314	316
316L	317	321	347	348
Martensitic Types				
403	410	414	416	416Se
420	431	440A	440B	440C
Ferritic Types				
405	430	430F	430Fe	446

The austenitic group of stainless steels contains both chromium and nickel or chromium, nickel and manganese as major alloying elements and possesses the highest corrosion resistance in the family of stainless steels. Austenitic stainless steels are inherently tough and well-adapted for fabrication.

Type 302 is the basic alloy of the chromium-nickel types, containing approximately 18 per cent chromium and eight per cent of nickel. Particular types containing varying amounts of

Fig. 2. Power brake bending. Annealed Types 301, 302 can take 180-deg bends

such elements as selenium, molybdenum, columbium tantalum and others are available for specialized applications. These are described in later paragraphs.

Another well-known characteristic of the austenitic stainless steels is their ability to be work hardened to exceedingly high strength and yet retain excellent ductility. Tensile strength in the annealed condition is considerably above that of mild steel—approximately 90,000 psi as compared with approximately 50,000 psi, and a yield point of approximately 35,000 psi, which is comparable with that of mild steel. But by cold working, tensile strengths up to approximately 200,000 psi can be developed in sheet or strip products, and in excess of 300,000 psi in fine drawn wire.

The austenitic grades may be obtained in various tempers or degrees of hardness as appropriate for the application. However, fabrication techniques must be modified with the increased temper.

The newest member of the austenitic family of stainless steels is the 200 series, consisting of AISI Types 201 and 202, which are similar in characteristics to Types 301 and 302. These stainless steels are a result of industry research during wartime shortages of nickel.

Containing higher manganese and lower amounts of nickel than the 300 series, they have proved to be highly successful additions to the stainless family. Their corrosion resistance has been found to be substantially equal to their counterparts and their tensile and yield strengths have been found to be significantly higher. They are in general, fabricated as easily and in the same manner as 301 and 302.

The steels in the martensitic group are hardenable by heat treatment, where they have their best mechanical as well as corrosion-resisting properties. Tensile strengths run from 70,000 and reach 105,000 psi when annealed, 200,000 psi when hardened.

Martensitic types are well suited for most moderately corrosive applications requiring high strength, hardness, and resistance to abrasion and wet and dry erosion.

Cold Working Ferritic Types

Ferritic types have higher resistance to corrosion than the martensitic types and they are not hardenable by heat treatment. They can be slightly hardened by cold working. These steels are only very rarely used in this condition, because the small increase in hardness obtainable is accompanied by a relatively large decrease in ductility.

Nevertheless, they can be fabricated without difficulty by cold working and they can be buffed to a high finish. Welding is possible, but welds may tend to be brittle—which usually can be overcome with heat treatment, stock or filler, or analysis modification.

Cutting: These operations on stainless steel require 30 to 50 per cent more shear capacity, heavier tools and more rigid equipment than are used for ordinary carbon steels. Use of lubricants is advised. Shear blades should be made from high-speed steel, ground with as great a lip clearance as possible, maintained sharp, and set close. This is especially true with the austenitic stainless steels since it is necessary to cut further through the thickness of metal.

Blanking and punching: More power and slower speeds are required likewise in these operations. The aus-

tenitic stainless steels are somewhat more difficult to blank and punch than the other grades. It is normal practice to put shear angles on punch or die faces to reduce the load on the equipment. Usually the die is designed for shearing actions in order to reduce possible distortion of the blank. If it is desirable to minimize distortion in a punched sheet, the punch should be designed for shearing. Punches and dies should be high speed tool steel, kept sharp, and small clearances maintained. A general rule of thumb is to work to a clearance of one tenth the thickness of the metal being blanked or punched.

In perforating, from 75 to 100 per cent more force will be required than for mild steel. Press speed should be reduced by 50 to 60 per cent. Again, care should be taken in setting clearances for all three types of stainless, particularly the austenitic types requiring especially close clearances. Holes to be perforated should not be smaller in diameter than the thickness of the material being used: recommended minimum diameter is one and a half to two times the thickness of the material.

To avoid distortion, the distance between adjacent holes should be at least half their diameter, with holes ⅛ in. or larger. Drilling has often been found more preferable for smaller perforations set closer together.

Flattening, deburring and annealing operations may be required after any severe cutting operation. If edges are badly burred and work hardened and are to be severely deformed in later operations, grinding or filing of the cold worked metal is often recommended.

Machining: Types 303, 303Se; 416, 416Se; 430F, 430F-Se were developed especially for machining purposes. Note that the grades are paired. The selenium (Se) grades are preferable for light cuts, while the others (sulfur bearing) are preferable for heavy cuts. Type 430F and 430F-Se can be machined at rates approximately 80 to 90 per cent of Bessemer screw stock; Type 416, at 75 to 80 per cent of Bessemer screw stock. If a non-free machining grade is selected for higher mechanical or corrosion-resistant properties necessary in the finished product, some sacrifice in machining properties will have to be made.

Here are essential practices for good machining of the stainless steels, equally applicable to other materials:

1. Maintain a high degree of rigidity of tools, tool holders, and equipment. No backlash.

2. Polish working faces of tools and keep cutting edges sharp.

3. Use a good coolant or lubricant in sufficient quantities. Cooling ability is important, but in most stainless steel machining it is more desirable to prevent heat from building up in the first place. High-quality sulfur base oils are usually used; however, soluble oils prove superior for clearing chips—especially in deep drilling.

4. Use sufficient power to maintain constant speeds. Data on correct feeds and speeds are available from the individual stainless steel producers and distributors.

5. If equipment is sufficiently rigid, there is a great advantage in using high-speed or carbide tools. They permit significant increases in working speeds.

6. Some general pointers on tool preparation include:

A. Drills—Use flatter angles such as 140 degrees instead of the conventional 118 degrees. Keep drills short, rigidly mounted.

B. Reamers—For general work use a high-speed spiral-fluted reamer with 30-degree lead or chamfer, and mounted, if possible, in a floating holder.

C. Mill Cutters — Use higher top rake angles, slower speeds.

D. Taps—Keep them sharp. A 50 per cent thread is preferred—75 per cent maximum. Take precautions to prevent chip jamming.

High speed twist drills, kept as short and as rigid as possible, are very successful in drilling stainless steel. Centerpunch the work lightly with a three-cornered punch. It is important that bit starts cutting immediately on making contact with the work and that steady feed be maintained to prevent the drill from work hardening the surface. In general, drill speed will be about one half that for mild steel.

Reciprocating types saws are used for sawing the stainless steels. Refer to saw manufacturers' data for correct speeds and fuels. High speed band saws with dull, friction teeth and high speed abrasive disc cutting are used successfully where the equipment is available. High-speed sawing has been found to be particularly suitable to ¼-hard and harder tempers, since it anneals the metal edge rather than hardens it.

Bending and Forming: Austenitic and ferritic stainless steels, rather than the martensitics, are most commonly put to bending and roll forming. The former are ideally suited for cold working on conventional brakes and rolling equipment. However, they require approximately twice the tool capacity needed for mild steel in these operations.

While the same methods are used for bending and roll forming, Fig. 3, stainless and mild steels, stainless dies and forming rolls should be designed

(Continued on page 190)

Fig. 3. Roll forming allowances should be greater than those for mild steel

Fig. 1. Ventilated dry-type transformer balcony installation in a steel fabricating building. Balcony installation of these units serves triple purpose of getting them out of way of production and protects them from unauthorized tampering

Maintaining Dry-Type Transformers

Correct Inspection and Cleaning Important, Too

By LYLE E. HOOD, Design Engineer, Transformer Div., Westinghouse Electric Corp.

IN GENERAL, TRANSFORMERS located as near as possible to the load center offer the most economical means of supplying industrial plants and commercial buildings.

Ventilated dry-type transformers are frequently used for these applications, since they offer certain advantages not obtained in liquid-filled units. Among these advantages are: 1. maximum safety from fire and explosion hazard due to elimination of all liquids; 2. installation costs are reduced due to ease of handling; 3. no provision is necessary for storing or reconditioning liquids.

Solid insulation in the transformer consists of such material as porcelain, mica, or glass in combination with a sufficient quantity of organic or synthetic materials and binders to impart the necessary mechanical strength to the insulation structure without detrimental effect on its fire-resistant qualities. Such insulation is defined by ASA standards as class "B" insulation.

Maintenance

Ventilated dry-type transformers are cooled by air. Normally, as the air surrounding the windings is heated, it rises to the top of the case and exhausts through the ventilators or louvers provided. Cold air is drawn in at the bottom and rises through the windings to replace the warm air that is exhausting through the top as illustrated in Fig. 2.

Air circulating in the building may be carrying particles of dust, chemicals, or paint fumes. As this air comes in contact with the parts of the transformer, the particles will tend to settle out. Some chemical fumes, if left to accumulate on the insulating and protecting varnish for a long period of time, will attack the varnish. Paints floating in the air could be deposited upon the windings and insulating blocks and porcelains.

Dust, paints and residue from fumes in locations where there is a very high content of them in the air, may accumulate on the windings and insulating surfaces tending to clog the coil ducts and reducing the cooling air circulation which may result in overheating of the transformer. This accumulation may further be detrimental to the transformer if allowed to collect for long periods, since the contents of the dirt may be conductors of electricity, thus reducing the insulation level of the transformer.

Location and operating conditions of a transformer are usually the deciding factors in determining the desired frequency of inspections of the core

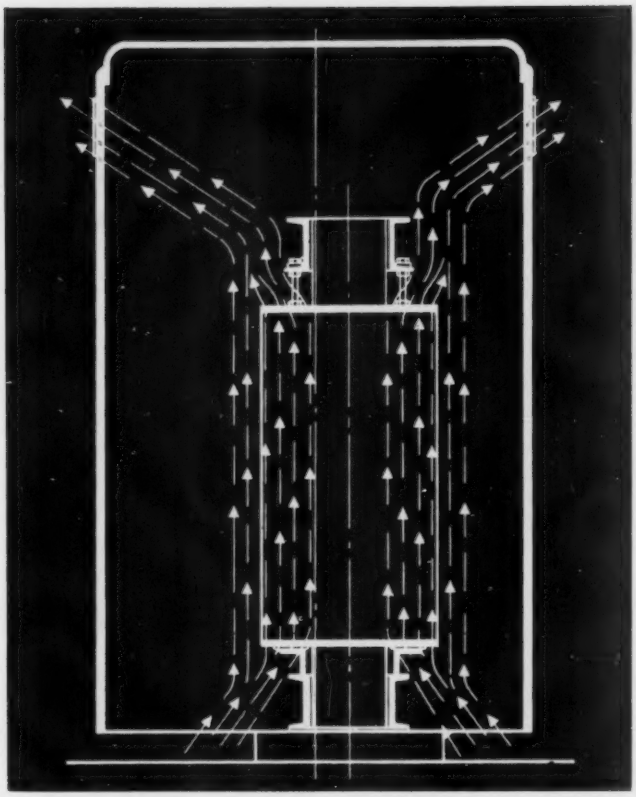


Fig. 2. Normal air circulation for cooling a dry-type transformer. As this air comes in contact with transformer parts it may deposit dirt

and coils. Inspections should be made at regular intervals and corrective measures taken when necessary to assure the most satisfactory service.

In locations where the air is heavily laden with dust, paint, or chemical fumes, an inspection every three months may be necessary. In clean, dry locations, an inspection may not be necessary more than once a year.

First inspection should be made after three months' operation. Based on the condition of the unit at that time, a definite schedule of inspection should be set up. After several inspections the period between inspections may be lengthened or shortened as found necessary.

With the transformer de-energized, grounded, and side panels removed, an inspection should be made for dirt, especially accumulations on insulating surfaces. Observations should be made for any signs of overheating, voltage creepage, or corona over insulating surfaces, as evidenced by tracking or carbonization. Evidence of rusting, corrosion, or deterioration of the varnish should be checked and corrective measures taken where necessary. Connections should be checked for tightness.

Transformers should be cleaned thoroughly each time it is necessary to do any cleaning. The best procedure is to first vacuum clean the inside of the transformer case and floor, then the core and coils, removing all visible dust and dirt from the windings and core. The horizontal and vertical ducts should be blown out using dry compressed air or cylinders of dry nitrogen reduced to a maximum pressure of 25 psi.

Particles which appear to be attached to the windings and other parts may be loosened by the use of soft brushes and blown off. All porcelain should be wiped off with clean, dry, lintfree cloths used with a polishing action. Grooves and areas not easily accessible to the hand can be cleaned by strips of cloth passed around the part.

Final operation is to check the unit closely to make sure no pieces of cloth or other foreign materials remain in the unit. Completely revacuum the inside surfaces of the transformer. When the cleaning operation is completed, the insulation and assembly parts should present a clear and pleasing appearance to the eye, and very little darkening should be noticeable when drawing a finger across the varnished surfaces.

Dry-type transformers usually present a brown appearance because of the color of the materials beneath the varnish and any units that may be darkening or have indications that the varnish is turning darker should be studied to determine whether or not the units are frequently overloaded. However, a dark condition of the varnish does not necessarily indicate the presence of foreign materials or a weakening of the insulation.

Testing Insulation

After the transformer has been cleaned and made ready for service, recommendations are that insulation tests be made to insure that the unit is in satisfactory operating condition. The megohmmeter readings should be compared with tests made at time of installation and after previous cleaning.

Following tests are recommended:

1. Insulation resistance. A minimum value of 2 megohms per 1000 volts of nameplate voltage rating is satisfactory. In no case should readings be less than 2 megohms per winding (for a one minute test at 25 C).

2. Low frequency high-potential test. These test voltages are as follows for a one minute interval.

Insulation Class in kv	*Test Voltage in kv*
1.2	2.6
5.0	8
8.66	12
15.00	20

Moisture is not a problem in dry-type transformers that are continually in service, since the heat from the unit will evaporate any moisture that might tend to collect.

However, transformers that have been subjected to unusually high humidity should be dried out before being put into service. Where drying is necessary, there are three acceptable methods: external heat; internal heat; or external and internal heat. The last method is quickest.

In any case, the winding temperature during drying should not be allowed to exceed 100 C. Insulation resistance measurements can be used as an indicator to determine the status of drying, by taking regular readings and plotting a curve. When the curve becomes flat, this is an indication that the drying has progressed to a satisfactory condition.

Records of many years' performance show that ventilated dry type transformers, properly installed and maintained, will provide most satisfactory and economical service. An example of the many different applications of this type of transformer is illustrated by Fig. 1.

Mechanization Sparks Motor Making

GE Medium Motors Almost "Untouched by Human Hand"

New plant cuts production cycle on standard medium motors . . . Two-week schedule reduced the three 8-hour shifts . . . Mechanical handling, straight-line flow and separate line for specials contribute to improvement

CAPABLE OF producing an almost endless variety (an estimated one million different models) of motors rated from 7½ to 30 hp, the General Electric Medium Induction Motor plant at Schenectady, N. Y., is built to utilize materials handling to the fullest advantage.

The plant is organized into three basic areas—it is, in effect, three plants in one. Two assembly lines, running along either side of the building are high-volume, low-variety manufacturing facilities using flow and mechanization techniques to mass produce 100 standard motor models.

The center line, a low-volume, high-variety manufacturing facility, draws standard parts from the two outside lines and then modifies and alters them to turn out the many other special types of motors made at the plant.

Revolutionary manufacturing processes have reduced to two the number of major hand operations involved—these occurring in the stator winding operation and part of final assembly.

Streamlined materials handling has sharply increased the flow and production of the motors, and with all but the largest punch presses mounted on movable mounts, a high degree of flexibility of the plant is achieved.

Punching operations are fully automatic, including feed of the sheet steel into the presses, movement of the punchings from blanking to indexing presses via magnetized conveyor belts, and removal of metal waste.

In the punch press area of one line, which produces 40 standard models of motors in the NEMA 254U and 256U frames, 7 punch presses are linked in an almost completely automatic operation that produces stator and rotor laminations.

In another automatic operation, wound stators are passed through three ovens in a dip-and-bake process on a preset cycle of about six hours. Stators are preheated, dipped in varnish, baked, dipped into paint, baked and finally dipped into silicone insulating material. In this cycle, only the loading and unloading are hand operations.

In the final assembly area, shafts are machined on automatic lathes, and four machines perform all the drilling, boring and tapping operations required on the end shields.

Completed motors are crated as they leave the final test platform, then raised by a movable carrier into a slotted storage bank accommodating 1500 motors, The storage rack receives completed motors at one end—inserted into rack "cubby holes" according to size and type of motor. Slope of the racks and their roller-equipped trays facilitate a first-in-first-out storage and handling arrangement. As a motor is removed for shipment from the front of the rack, the rest of the motors in that rack section move forward to place another motor in "picking" position. From this position, another movable carrier picks motor out of the rack and lowers them to floor level for pickup by forklift truck for movement into truck or rail car for ultimate shipment.

Fig. 1. Punch press forms blanks for stator and rotor laminations. Conveyor belts under floor carry blanks to indexing presses. Chutes divert stator and rotor laminations to appropriate press areas. Adjustable mounts under press

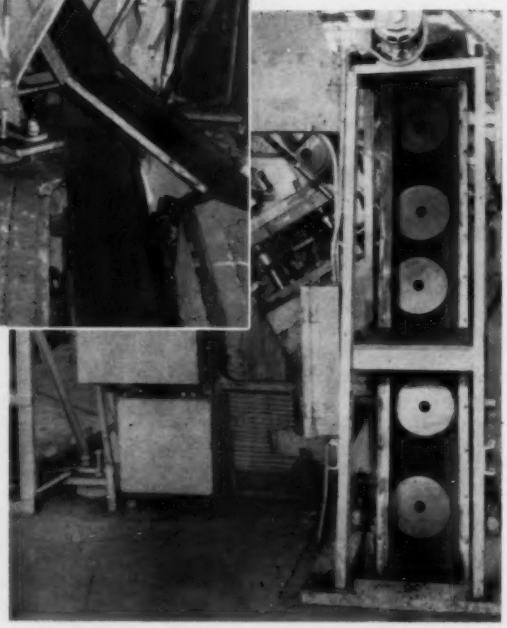


Fig. 2. Blanks from primary punch press area shown arriving at punch press for further work. Blanks are carried from underfloor conveyor belt on this magnetized conveyor belt section, in almost vertical travel. Magnets are in frame

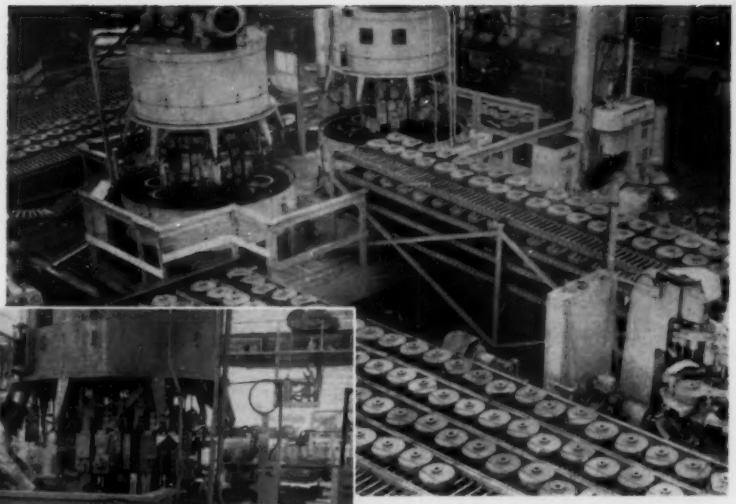


Fig. 3, below. End shields for all sizes are machined to final tolerance on these Bullards. Operator controls flow of various types from storage racks, left. Stop pins protruding through conveyor rollers are actuated by buttons on platform, to release shields

Fig. 4, above. After machining, primary end shields are "gathered" on conveyor racks. Fed by gravity from these racks to subsequent machining operations, shields of various types of motors are on tap for machine operators. Boring, reaming and tapping are done here

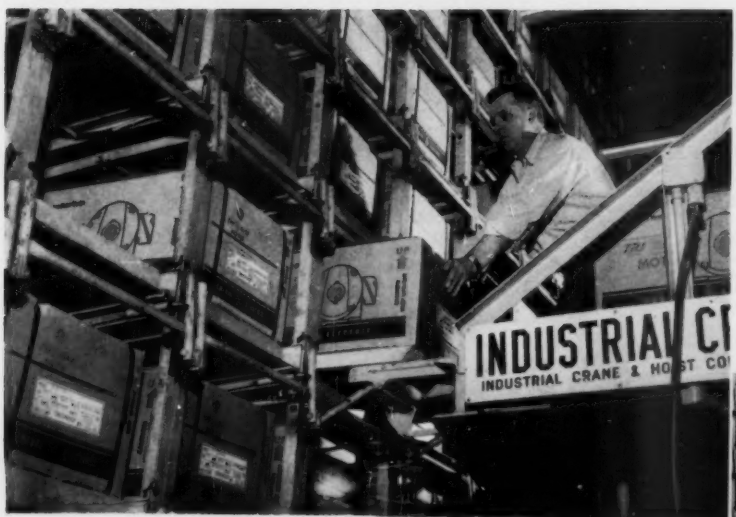


Fig. 5. At storage rack, one of three in building, operator removes crated motor from rack for shipment. Motors are loaded into rack from rear, using hoisting carrier similar tc that pictured. Slope of roller racks facilitates gravity feed of motors, back to front

Fig. 6. In next operation in shipping cycle, operator lowers carrier load of motors to floor level, for pickup by forklift truck. Crated motors are already on wooden skids, ready for shipment. Tubular stops on storage rack hold motors in place until "picked"

Regular and careful exterior painting can add greatly to the life of a glassed steel vessel. Care should be taken, however, not to paint over such things as drive shafts, oil sight gages, manufacturers' type labels

Leveling straight side of glassed steel reactor assures vibration-free operation

How To Care for Glassed Steel Equipment

Special Equipment for Special Purposes Deserves Special Attention

By B. G. STAPLES, Research Chemist, The Pfaudler Co.

WITH THE ADVENT of new materials, new chemicals and new processes, the use of corrosion-resistant glassed steel process equipment has become more and more widespread. Here's a round up of best practices in maintenance of such equipment as suggested by our company.

First of all, it must be remembered that glassed steel equipment is special equipment and cannot be handled like conventional steel or alloy tanks. However, with proper care, a life of twenty-five years or more is not unusual.

Use of glassed steel is becoming more widespread. This is so because the cost of fabricating the material is low compared with its many advantages. It is corrosion-resistant to all but hydrofluoric acid, even at elevated temperatures and pressures. It will handle alkaline solutions up to a pH 12 and 212 F., and it eliminates product contamination as it is simple to clean.

Good maintenance begins with proper installation. Here are some points to consider:

1. Pre-determined location of equipment, allowing ample working space for installation, maintenance and inspection.

2. Provide adequate foundation supports or hangers to prevent any kind of strain or warping. This insures straight piping runs from connection.

3. Avoid piping strain either from actual weight of the pipe in the fittings or from thermal expansion and contraction. Thermal strains in piping may break the glass of the flanges of the units if expansion is not taken into consideration. Pipe flanges should be bolted together without forcing. Installation of additional pipe loops or expansion joints to compensate for thermal or mechanical strain may avoid costly shutdown later.

4. Protect flange openings and interiors of vessels against physical damage. If it is necessary to enter a vessel, wear rubber-soled boots or heavy wool socks over shoes.

5. Use properly constructed pressure release valves whenever unit is to be operated with more than a few pounds of internal pressure.

6. Handle all repair tools with care. Protect the flange or glass-lined tank against dropped tools or from scratches or from grit or dirt by use of a rubber matting.

7. Use gasket material suitable for process for which unit is to be used. Again, avoid excessive or uneven

flange strain in trying to get an effective seal.

8. Assemble flanges evenly and gradually by progressing from one nut to opposite nut. Draw up nuts on flanges evenly and gradually to distribute load. After unit has been heated and cooled, retighten nuts where necessary.

9. Welding or torch cutting should be kept at least two inches from equipment. Keep flame or cutting torch from striking jacket wall.

10. Be sure tank is level.

Preventive maintenance of glass lined equipment can add substantially to the initial purchase cost savings of glassed steel equipment over alloy equipment used in corrosive processes.

Frequent and proper inspection of glassed steel equipment is extremely important. Detecting potential sources of trouble and proper correction adds substantially to the life of the equipment. These trouble spots may be small mechanical breaks, leaky gaskets, glass corrosion, temporary repairs or just plain spillage or poor housekeeping. Here are some points to consider in your preventive maintenance program.

1. Inspection. Frequent visual and occasional electric arc inspection when necessary should be standard operating procedure. Usually, due to rather fast action of corrosive chemicals on the base metal, it is necessary to quickly detect microscopic breaks. An electric tester with a recommended regulated voltage is used for all breaks in the glass lining.

However, certain precautions should be taken when using an electric tester. Glass is a good insulation material, but any material can be broken down by an electric arc if high enough potential is applied to it. Commercial electric testers vary considerably in their ultimate voltages, some ranging as high as 80,000 volts. Breakdown of perfectly sound glass is possible with voltages in this range. We recommend that spark testers used for inspection of glassed steel equipment should be limited to 20,000 volts output. Frequency and amperage values must also be controlled in order to prevent damage due to electric testing.

High frequency currents cause dielectric heating which may result in enough temperature to melt the glass in localized spots. Laboratory tests have shown that the maximum frequency used should be 4 megacycles. Amperage ratings which are not harmful to the human body will not cause glass breakage. The American Institute of Electrical Engineers has set this figure at 5 milliamperes.

Although glassed steel equipment is checked usually three times by the manufacturer before shipment to the customer, most users go over new equipment upon arrival or after installation has been made to insure that no damage has been done during installation. After equipment has been in service the frequency of electrical inspection should be determined by the severity of the chemicals processed.

Repeated high-voltage testing is not recommended because of the danger of eventual breakdown of glass. Visual inspection is often all that is needed. If questionable areas are discovered during visual inspection, they can be electrically tested. For hazardous areas where spark testers cannot be used, the vacuum tube voltmeter or a low-voltage dry cell electric supply can be utilized to check for continuity in glass lining.

2. Jacket Cleaning. Probably the surest way to damage a glassed steel reactor is to circulate an acid solution through the jacket. This causes glass chipping and the glass chips off in small pieces that resemble fish scales. If the acid remains in the jacket for

A feeler gage is another tool that is useful in glassed steel equipment care. This workman is determining whether shims are necessary in order to safely and securely level the gasket on this 30-in. glassed steel flange

Below: Workman tightens hold-down flange on glassed steel baffle, drawing up alternate nuts evenly in order to best distribute load

any length of time, practically all the glass will come off the affected area. Chipping occurs under all conditions where acid cleaning solutions are used. Inhibitors in cleaning fluids do not prevent chipping although in some cases the spalling is delayed.

Treatment of circulatory water is useful to prolong the time before jacket cleaning is required. When heat transfer characteristics become poor, chemical cleaning is usually the least expensive and time consuming. A solution of sodium hypochloride to loosen the jacket scale has long been advocated by our company. Since the recommended solution is alkaline, no hydrogen is involved to cause the chipping of the glass and consequently no damage can occur to the glass lining.

3. Gaskets. Here are a few general rules which should be remembered about gaskets for glassed steel equipment. Briefly, these are:

Porous gaskets should never be used. Flange failure due to seepage of chemicals through the gasket has in the past been responsible for many failures of equipment.

Compressed sheet gaskets can be successfully used if the chemical conditions warrant their use and if discoloration of the product is not objectionable.

Successful use of any gasket on glassed steel equipment depends upon its proper installation as well as its correct composition.

Proper physical dimensions of gaskets are extremely important especially if the equipment is to be operated under vacuum.

Rubber compounds and woven gaskets should never be used inside Teflon shields. This may cause splitting of the Teflon or leakage by channeling through the substitute material.

For every high vacuum work Teflon shields are mandatory and were found to be the only material which successfully passed certain vacuum tests.

4. Acid Spillage. Spillage of acids on the unjacketed outer surface of a glassed steel vessel results in reaction with the steel which may cause chipping or fish scaling of the glass on the inside. This problem can be attacked in three ways: 1. Minimize spillage. 2. Protect the exterior of the head with a coating or a shield. 3. Hose down if spillage has taken place.

Painting or coating even though they may not be completely resistant to chemical attacks will materially reduce damage due to spillage. Alloy shields or aprons are often used over the entire top head particularly when the head is insulated. Corrosives are not easily washed off installations and delayed chipping may result from eventual seepage of acids through the insulating material.

5. Storing Glassed Steel Equipment. When it is necessary to store glassed steel equipment outdoors the following procedures, with variations to provide for special circumstances, are generally accepted:

Be sure that jacket is empty to prevent damage during cold weather.

Remove all manhole and cover clamps except the few that are necessary to hold the cover in place. Removed clamps are stored in a drum covered with oil and the container sealed. Clamps that are left on the unit should be heavily coated with Klad-Kote No. 101.

Spray edges of all flanges with plastic spray to prevent rusting which might cause chipping at glass edges.

Cover all flange openings except bottom outlet with plywood or rubber flange covers sealed with 1½-in. anhydrous black tape. Outlet is left open to prevent collection of moisture.

Coat all thread openings such as bosses and couplings with Klad-Kote No. 101 and seal by driving a soft wood plug into opening.

Paint the outside of the kettle as required, using caution not to paint what is not supposed to be painted such as control valve stem and sight gages.

Thermal Shock. Since linings in glassed steel vessels are true glasses they are subject to thermal stresses. Although they are modified to the extent that they are bonded to steel and firing imparts helpful compressive stresses, there are still definite thermal limits beyond which damage will occur. The usefulness of glassed steel equipment is not necessarily restricted to certain temperatures because of thermal shock possibilities. It is only necessary to keep temperature differential within specified maximum limits to prevent thermal shock. Thermal shock is most apt to occur when a cold charge is dumped into a hot vessel with the maximum safe temperature differential between the charge and the kettle in this situation becoming lower as the reactor temperature becomes higher. Charging a cold vessel with a hot charge can also cause damage if the temperature differential exceeds 200 F throughout the operating temperature range at which the glassed steel equipment is normally used.

Glassed steel is tough, but not so durable that it can be abused. Recognizing that glassed equipment is specially designed and made for specific uses, and that it requires special care, is the first step in getting maximum life from the equipment.

Here is glassed steel equipment properly protected as described in text

Welding Saves $1000 Per Day

Thirty Days' Lost Production Averted By Wire Mill

FIRE SUDDENLY broke out on a Monday morning in the engine room of the wire rod mill, Wickwire Company, Cortland, New York. By the time firemen arrived the big transmission belt on a giant multi-ton cast iron fly-wheel was in flames. When cold water from the fire hoses hit the hot wheel one of the segments, weighing 2,800 lb, cracked in two places.

Part of an old Corliss steam engine built in 1902 and installed at Wickwire in 1903, the wheel is 22 ft in diameter, 30 in. wide and has a rim speed of about 90 ft per second. It drives six roughing stands and eight finishing stands of a continuous rod mill and is the only available source of power for this operation. Having the damaged wheel down meant $1,000 a day in lost production. Wickwire was advised that delivery of a new casting would take at least 30 days and more likely 60 days, and insurance would cover only a fraction of the total possible loss.

H. D. Baker, the company's machine shop foreman, decided to try repairing the cracked segment by welding. He had to be sure of a high strength weld because if the segment should break loose at running speed, it would either take the roof off the building or demolish the engine.

Welding began late in the afternoon of the Tuesday after the fire and went on till the job was completed at 7:30 the next morning. The wheel was then thoroughly tested and inspected and the rest of the damage was cleaned up during the remainder of the week—a big job which was performed quickly. The rod mill was actually back in operation seven working days after the fire and, nearly a year later it is still in perfect shape.

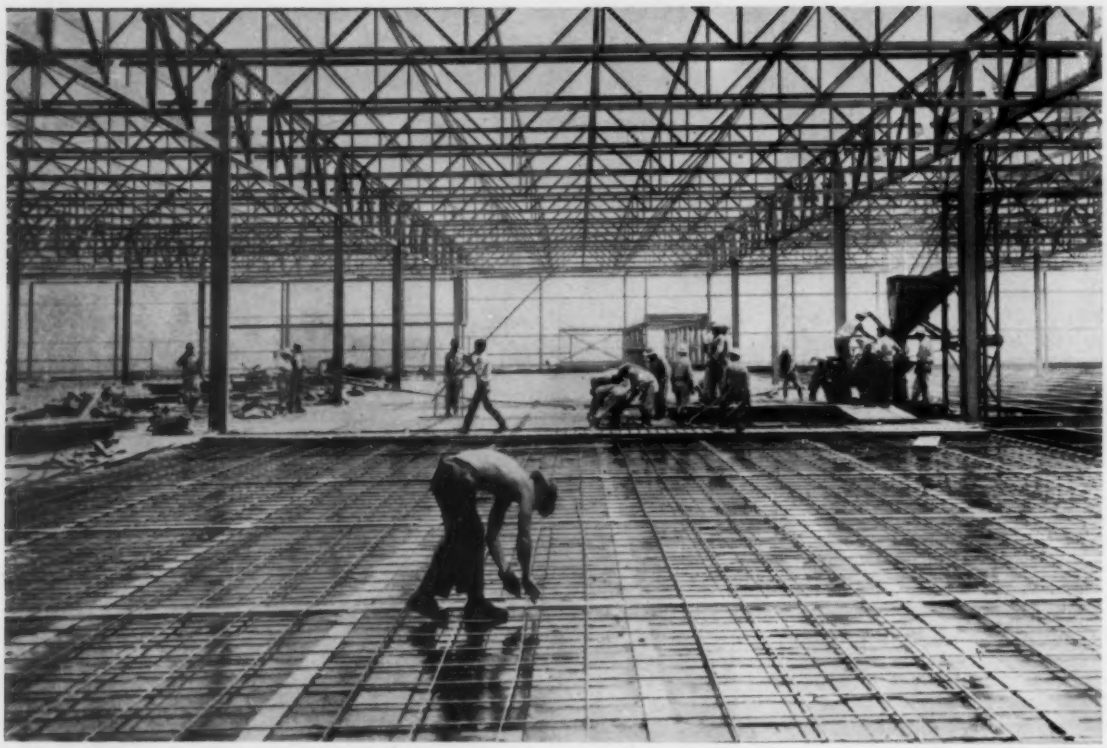
This is how the welding was done step by step. To ready the segment for welding, it was unbolted and removed from the flywheel. Double-V grooves were chipped from each side of the web, leaving about 1/8 to 3/16-in. of metal separating the root of each V.

Wickwire welders used a natural gas heater to preheat the ends of the casting and when the outside face of the segment was too hot to touch 12 in. from the web, they began welding. Preheat was then applied to the other end of the casting.

One pass was run into the root of both cracks, followed by a second layer. The casting was then turned over and the V's on the reverse side were back-chipped to weld metal and additional passes were laid in. The gas torch was kept in operation heating the end not being welded at the moment. After the fifth pass was made the casting was turned again and the initial side welded to completion. The wheel was turned again and finished entirely. To prevent too rapid cooling, the segment was covered with foil-lined bags.

All welding was performed with 5/32-in. diameter Ni-Rod "55" electrodes at about 130-140 amps. As each bead was deposited, it was peened with a small ball peen hammer, the slag chipped off, and the weld area wire brushed. Actual cost of the welding was $350—including labor.

Weekly inspection of welded web (arrows) on 22-ft flywheel includes checking with inspection dyes. Wheel extends 10 ft below floor level, 12 ft above, and travels at rate of 90 fps. Part of the steam engine is visible in the foreground



Reinforcements and flooring base are checked prior to pouring of cement and addition of the tough topping aggregate

Throw-On Floor Surfacing

Tough, Non-Skid, Dense Aggregate Used at Ford Plant

PLANT CONSTRUCTION history was made this summer when over a million square feet of surface-hardened flooring was laid for the new Rosemead Assembly plant of the Ford Motor Co. Located at Rivera, California, southeast of Los Angeles. The plant was constructed for the assembly of Mercury automobiles which will be turned out soon at the rate of 10,500 per month.

To meet heavy duty, high traffic requirements, an emery aggregate hardener was worked into the surface of a still-wet, regular steel-reinforced, 6-in. concrete base. The base was designed to have a 3000-psi compressive strength.

The surface hardener, a product of Walter Maguire Co., Inc., is dry-mixed in a regular concrete mixer, and then is cast on the still-wet underslab with shovels. The workman casts the hardener in one direction, say to his left, and then from a few feet to his left he casts to his right, creating a criss-cross of the mixture over the concrete base.

At the rate of 90 lb of hardener per 100 sq ft of slab, the hardener is worked into the concrete with wooden floats which are manipulated by hand. After the concrete slab, with its worked-in surface hardener has set for half an hour, the top is gone over with circular mechanical finishing machines.

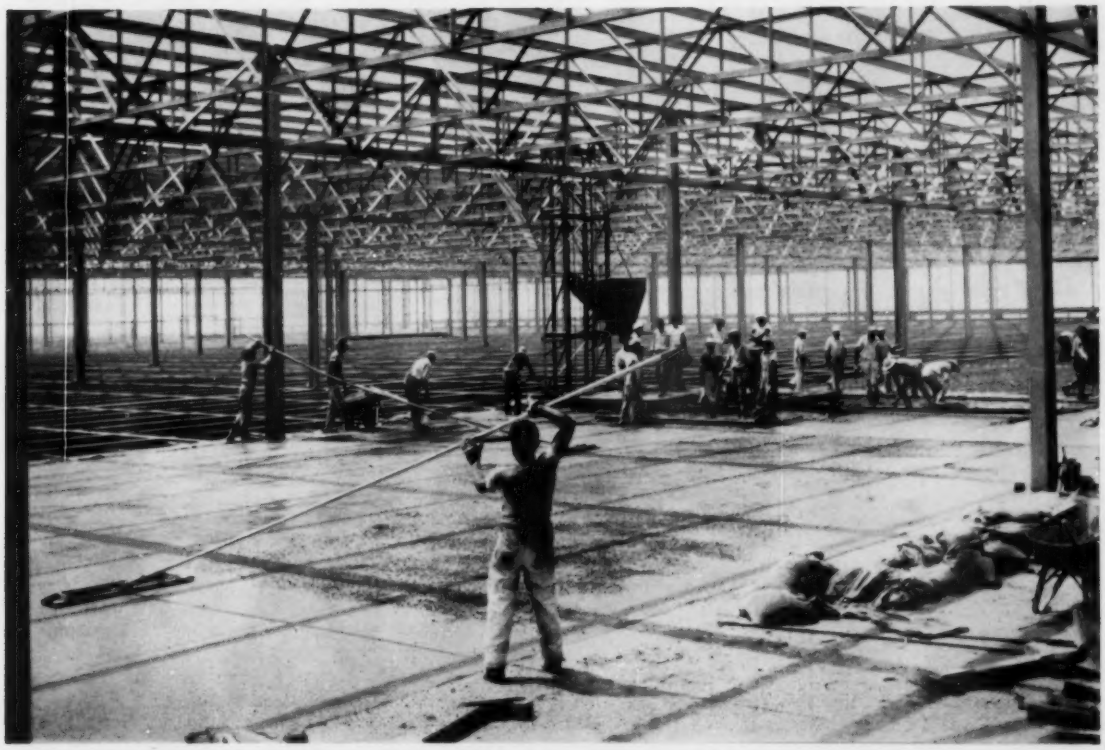
Last step in putting down the floors is the application of a membrane curing compound. This compound is sprayed on the surface as soon as it has been gone over by the finishing machines. Because the weather is hot and dry in Southern California, curing must be applied quickly to prevent the moisture from evaporating from the concrete. Concrete which dries too rapidly loses strength and many of its good properties: It is apt to become criss-crossed with shrinkage cracks and develop a soft dusting, crumbling structure.

Membrane curing compound which is sprayed on the floor surface has a waxy texture and closes the floor surface and cures the slab by preventing the moisture in the concrete from evaporating, thus the chemical process may continue yielding a strong bond between aggregate and cement. After twenty-eight days the concrete is considered cured.

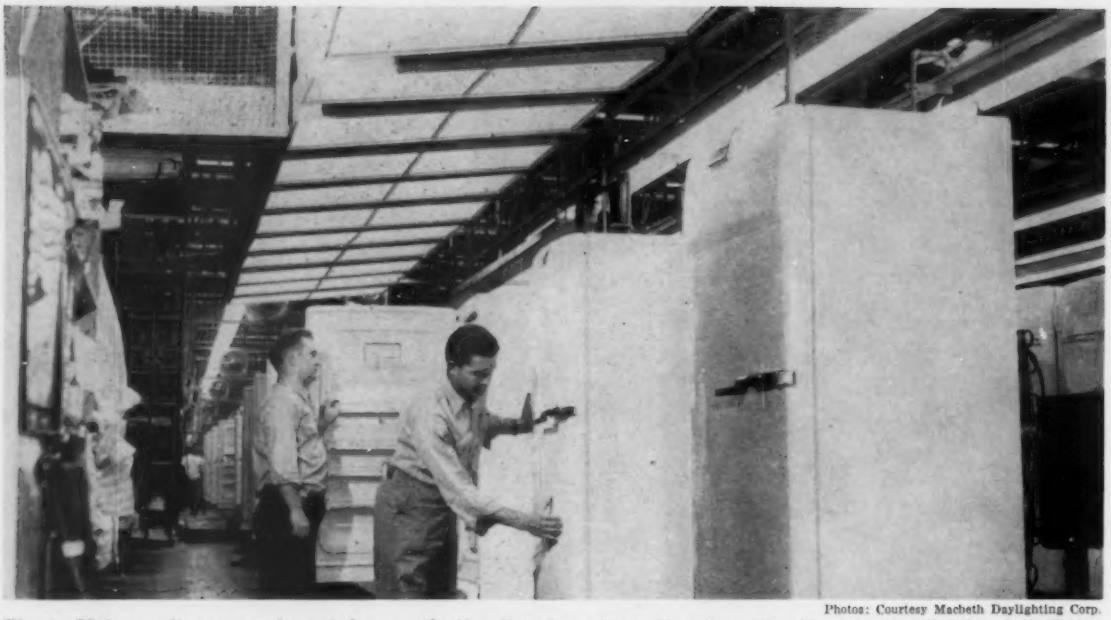
Hot, dry climate requires that the floor be laid as rapidly as possible. The construction crew laid an average of 9000 sq ft every six working hours. This included the pouring of the concrete, working in the surface hardener, finishing off the slab and applying the curing compound.

Plant engineers cited distinct advantages to the use of an emery mixture to a floor surface: 1. Floor remains smooth because of the tough, dense emery particles at the surface. 2. Floor is non-skid because the emery is abrasive. 3. Floor is non-porous, non-dusting, moisture resistant.

Workman shown casting the aggregate mixture. Lumps and dark spots at the left show how it appears before floating



After the aggregate has been cast over the entire section of wet concrete it is floated into the slabs as shown in this photo



Photos: Courtesy Macbeth Daylighting Corp.

Fig. 1. Major appliances are inspected on production line for color uniformity with aid of special lighting installation

Light Sources for Color Matching

COLOR NOWADAYS is a very important factor in the production of many items including textiles, leather goods, paint, plastics, food products, cosmetics, color schemes of automobile bodies, colored plumbing fixtures, electrical appliances, and so on. It is equally important in the field of the graphic arts where printed reproductions in color are widely used.

Now that such a large and diverse number of products must meet color specifications it is important that both producer and customer have a similar source of light for making color comparisons which is acceptable to all concerned. Otherwise it would be impossible to be sure of controlling and matching colors because of the fact that different light sources contain differing amounts of various colors. A sample will not look the same under lights from sources such as a so-called daylight fluorescent lamp and a tungsten filament incandescent lamp.

Formerly it was customary to make color comparisons at a north window, but such light varies according to the time of day and year. Cloudiness and the clarity of the atmosphere are other variables affecting a natural light source, so that actually there is no constant natural standard that can be used. Furthermore, many industrial plants where color matching is required are operated at night.

An aid to standardized color evaluation has been developed in artificial daylight units which are practically equivalent to a slightly overcast but otherwise clear north sky. They have a light intensity between 75 and 300 foot-candles. With such equipment, it is possible for both the manufacturer and the customer to view the colors under exactly the same conditions.

Accurately similar conditions of lighting can be equally important for quality control in different steps of manufacturing.

Several models of artificial daylight units are available, the artificial daylight source in all of them being obtained from incandescent bulbs with glass, daylight conversion filters. For basic color matching of pigments and colorants in paints, inks, dyes, plastics, etc., a two-variant color matching lamp is essential. The two light sources, incorporated in a single piece of equipment, are north sky daylight and horizon sunlight (yellow orange). Colors matched under both these light sources will match under intermediate illumination, including fluorescent. The reverse, however, does not hold.

There are two other points which must be realized in connection with critical visual color evaluation. One is that the so-called daylight fluorescent lights are too deficient in blue and red energy to be sufficiently close to natural daylight. However, fixtures are available with special color corrected fluorescent tubes which are in turn blended with incandescent light in the proper ratio to produce an efficient simulated daylight. This type of color balanced lighting is adequate for secondary industrial color inspection, grading and sorting of materials to maintain production color uniformity.

The second point which must be borne in mind is that visual color comparisons and evaluations should be made only by people without defective color vision. Simple tests have been devised by the American Optical Company to determine whether a person's color vision is normal or not, and how close to normalcy it is.

Finally, it is necessary to give prospective viewers some training to enable them to distinguish between small differences in color.

Generally, it is necessary to exclude outside light so as not to interfere with the accuracy of the color appraisal by the artificial daylight. Sometimes this is done by means of a booth. The inside is a neutral gray to prevent improper chromatic (color) adaptation of the viewer's eyes, and to avoid brightness contrasts which accelerate eye fatigue.

Another method of installing the lights is in the ceiling of an area free from other sources of light.

Fig. 2. Production samples of textile are checked against standard under skylight installation of artificial daylight

Fig. 3. Artificial daylight lighting is suspended from ceiling in printing plant where careful color matching is essential

Fig. 4. Gray booth houses lighting for materials matching

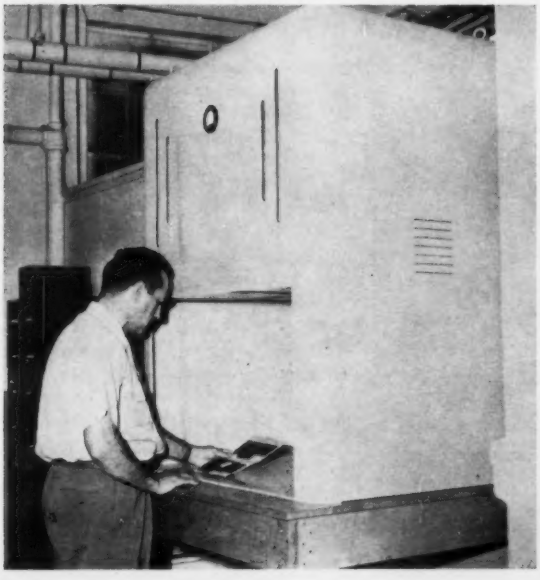


Fig. 5. Tobacco grading under ceiling installation of lamps

How To Control Industrial Noise

Part II. Acoustical Treatment, Sound Absorbers Inside Plant

By DR. HOWARD C. HARDY, Consultant in Acoustics, Chicago, Ill.

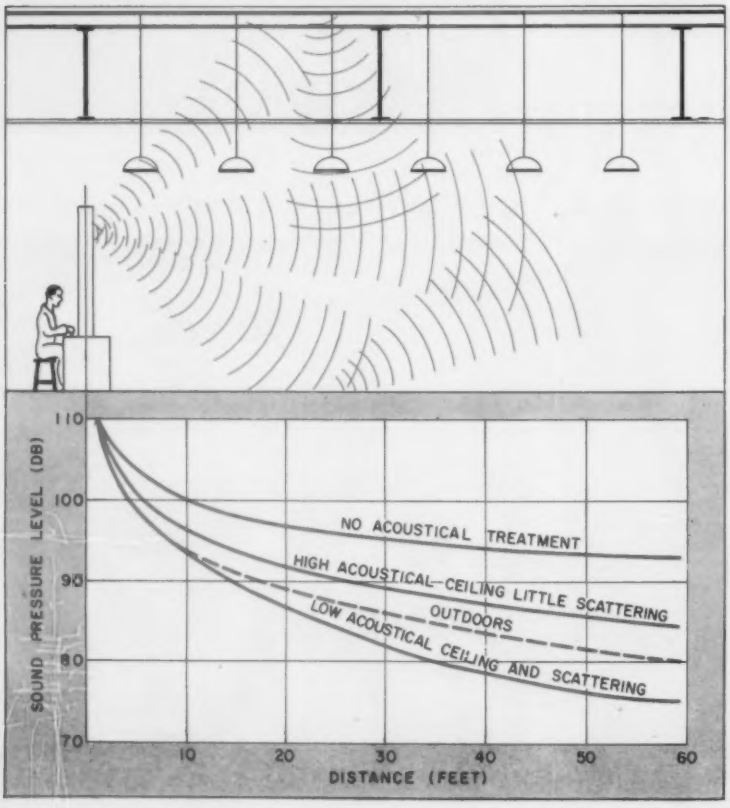
IN THE FIRST PART of this series of articles[1] the general acoustic terminology and acoustic principles involved in noise control of industrial plants were reviewed. This second article in the three-part series will be given over exclusively to indoor noise problems. In a later issue, the outdoor noise problems will be discussed.

Best time for the plant engineer to examine the noise problem is when a new plant is being laid out. With a knowledge of previous operations, a fairly accurate estimate of noise conditions can be predicted. Machine layout, acoustical materials, and partitions can then be deliberately designed to obtain optimum advantage with the minimum capital and maximum space utilization and convenience of operation. Machines can also be chosen that fit noise as well as production criteria. This last statement is not just wishful thinking. In at least three plants known to the author, noise considerations as much as productivity lead to the choice of machines for a particular job.

Individual requirements for each individual plant are so different, even for two making similar products, that it would be impossible to make general recommendations which would act as overall panaceas. Like architectural design and other kinds of plant engineering, each case has to be worked out individually. There are, however, some general principles which simplify the approach to the problem.

[1] "How to Control Industrial Noise," page 98, Nov., 1956.

Fig. 1. This drawing shows how sound usually drops off in direct ratio to distance from the sound source. However, when the sound is reinforced from floor and ceiling there is very little drop with distance. Use of acoustical treatment greatly reduces the sound level at a distance from the machines. If there is a low ceiling, with resultant scattering, the sound may drop more abruptly than it does outdoors



Sound Absorption

First, let us consider the way sound propagates through the plant from a single machine. Refer to Fig. 1. At close distance, sound drops off by spherical spreading just as it would outdoors. Outdoors, sound attenuates according to the inverse square law, which simply means that every time the distance is doubled, the intensity is reduced four times, or 6 db.

Indoors, a distance is reached where the original sound is combined with that reflected by all the surfaces of the room. At a distance (in feet)

$$r = \sqrt{A/16\pi} \quad (1)$$

where A is the total absorption in the room in sabins (see Fig. 5 in the first article), the reflected energy equals that directly radiated by the source. At greater distances the intensity is almost independent of the distance and depends almost directly on the absorption.

If the room absorption is low, the introduction of acoustical absorptive materials into the room will have several beneficial effects, as follows:

1. It will lower the noise intensity

at a distance from the machine. As shown in Fig. 1, this amounts to between 3 and 12 db depending on conditions. In fact, for those plants which have low ceilings and a number of machines, equipment or stock present to scatter the sound, the noise will drop off with distance faster than it does outside as indicated by the lower curve. In long or wide open rooms the effect will be somewhere between the upper two curves.

2. When the noise is due to individual impacts, it lowers loudness by reducing reverberation. Figure 2 depicts the sound produced by a series of impacts occurring at regular intervals of time both with and without acoustical material. With acoustical material the sound does not build up so intensely and it dies out much more rapidly. The loudness of the sound is much less. The effect may be as much as 15 db or greater in some cases. Resulting sound is less damaging to hearing, favors speech communication.

Treatment and Enclosures

3. With acoustical treatment, the source of the sound is more easily located. In the reverberant conditions the sound waves pass by the ear in all directions and the source is difficult to locate, an effect which is psychologically unpleasant. After treatment, listeners usually comment "The sound stays put. If we have to hear it, it sounds better to know where it is."

4. Partial enclosures of the machine are much more effective after acoustical treatment. Use of acoustical materials will not lower the sound intensity near the machines for the operator of the machine. It will, however, lower the level from all other machines. It is the firecracker which goes off behind you, not the one you throw, that annoys you. Usually workers do not object to sound of their own machines, only to that of the other fellow's. This is another psychological effect which it is difficult to evaluate with simple meter readings.

When the machines are equally noisy and close together, the beneficial effect of using acoustical absorption is questionable, especially when there is a high ceiling. Another case where acoustical material is less helpful is when there is already high absorption due to large open window areas (or other wall openings), or large piles of shipping cartons or textiles (both of which are good absorbers).

From personal observations, however, it is estimated that ninety per cent of all production areas would be significantly improved by use of acoustical materials. For about forty per cent there would be a very marked

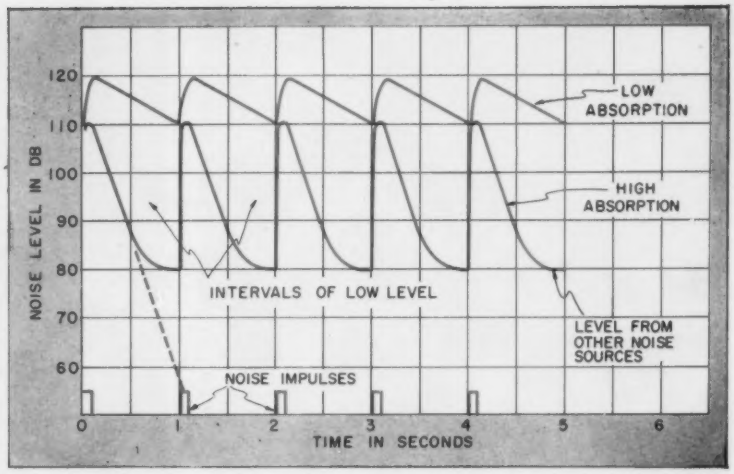


Fig. 2. Effect of acoustical materials on impact noises. Intervals between impacts give much lower levels and favor hearing recovery and speech communication

improvement. As an example consider the case of a plant where there is a cold header, a machine for putting the head on large bolts. There was only one such machine in one large high open room, of approximately 40,000 sq ft, where there were approximately forty workmen. Initial plan was to cover the working end of the machine, after acoustical absorption was added to the general room area. Acoustical treatment made such a remarkable difference, however, that the machine cover was never built.

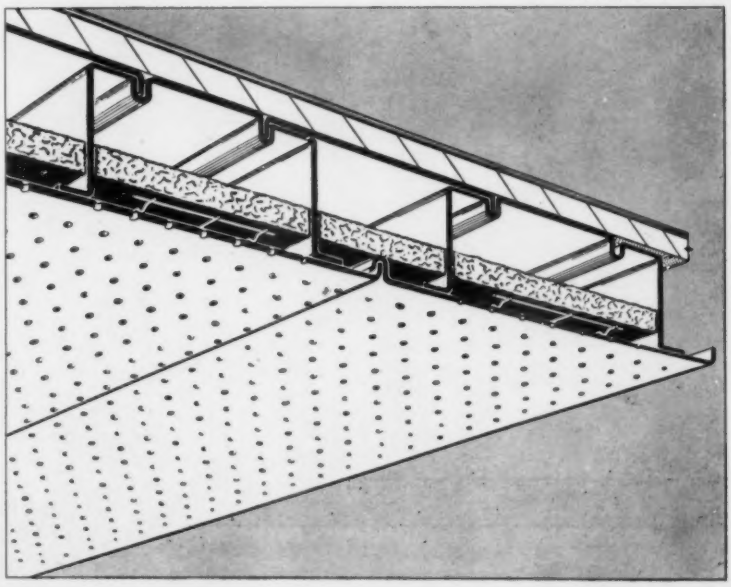
Most of the acoustical materials developed up to the present time have been designed to go on the ceilings of offices, restaurants, and corridors. Often a square foot modular unit is used. This type is not very suitable for industrial use where the requirements are somewhat as follows:

1. Low cost per unit area.
2. Large area per unit.
3. Fire resistance.
4. Low maintenance cost.
5. Good high frequency absorption.

Good surface appearance is not as essential as in offices.

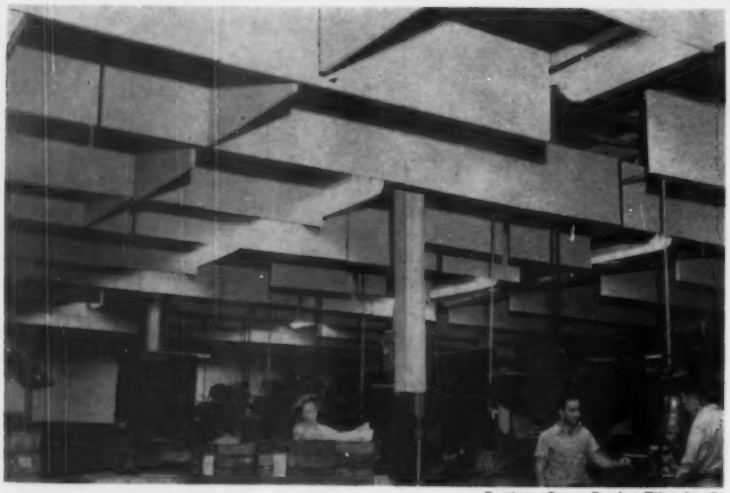
For new plant areas, the best plan appears to be to use some economical ceiling acoustical materials. For poured concrete roofs, acoustical form board left after pouring appears to be a ready solution. Roofing slabs of porous cement-bonded seaweed or woodfiber is another type of treatment. Some of the prefabricated con-

Fig. 3. Prefabricated metal roof panel acoustically treated with glass fiber insulation
Courtesy: Fenestra, Inc.



Courtesy: Elof Hansson, Inc.

Courtesy: U.S. Gypsum Company



Courtesy: Owens-Corning Fiberglas Co.

Fig. 4. Three types of space absorbers. Such units present more than one side to sound with resultant high efficiency

crete block and metal deck roofs are or will be supplied with acoustical surfaces, sometimes covered with perforated materials. As an example, see Fig. 3.

Finishing rooms or final assembly rooms in some textile, equipment and appliance plants have a suspended acoustical ceiling at the height of the lighting system. One of the best materials of this kind is corrugated perforated aluminum sheet on top of which is laid an acoustical blanket. These sheets are supported over large spans and give easy access and low maintenance for comparatively low initial cost.

Surface acoustical materials are specified by giving their absorption coefficient at six frequencies: 125, 250, 500, 1000, 2000, and 4000 cycles per second. The absorption coefficient is the decimal fraction of perfect absorption the material has. For instance see Table I. The number 0.74 means 74 per cent absorption.

When the plant is already constructed and being used, the presence of pipes, utilities, and machines, plus the necessity of production shutdown makes the installation of surface treatments rather impractical. The practical treatment in this case is space absorbers, sometimes called "functional absorbers." These are absorbing surfaces of various shapes, which are hung up in the space of the room rather than on the wall. The acoustic energy passing back and forth through the room can be absorbed by striking such surfaces as well as the walls. In fact, since they present more than one side to the sound field, they are sometimes more efficient than wall materials.

Several sizes and shapes, such as panels, cones, and polyhedrons are now being marketed. Figure 4, shows different types of such treatment. The shape is not as important as the number of absorption units per panel. This depends somewhat on the spacing, the panels being less efficient when close together. The spacing must be specified, therefore, to obtain acceptable data. Absorption of ten or more sabins per unit is possible, meaning that one unit is equivalent to 20 sq ft of ceiling covered with a material with a coefficient of 0.50.

Space absorbers are readily installed at night or over weekends. Quite often they are suspended from horizontal wires. Their weight may become important, therefore, in some applications. They should always be hung high enough and in such positions that they will not cast objectionable shad-

ows. Make certain, too, that they do not oscillate in the ventilation air streams.

Partial Enclosures

One of the most effective ways of controlling a machine is, of course, to put an enclosure around it. Often, however, partial enclosures are acceptable. Such shapes as that given in Fig. 5 are examples of such structures. The interior is always lined with acoustical material, usually covered with a perforated facing.

Under these conditions the amount of noise power reduction is, to first approximation, given by the ratio of the open area to total area of the enclosure, the equation being:

Noise level reduction

$$= 10 \log S_T/S_O \quad (2)$$

Thus, if the enclosure is 0.8 closed, the noise level reduction is 10 log 1/0.2 or 7 db. One can see the futility of large reduction with 25 per cent enclosures.

Occasionally a product such as home appliances must be tested for noise or acoustic performance in the presence of production area activity. An enclosure or partial enclosure such as E, F, or G in Fig. 5 can be effective for such a listening space. Again, such special facilities usually need the specific design of an acoustical engineer.

Barrier walls can be highly effective for reducing the sound in the immediate vicinity. Reductions up to 25 db are quite common on the walled side of large enclosures. An example of such a treatment is given in Fig. 6.

Another point not usually recognized is that the enclosure is equally effective without a top if the ceiling is acoustically treated or space absorbers are used over the top of the enclosure. See Fig. 8. The area treated should be equal to the area subtended by the top edge of the enclosure with the sound source at the vertex. Without an overhead acoustical treatment, however, the sound is reflected back to the floor and nearly all the effectiveness is lost. Thus, with proper use of wall or space absorbers, access to the machinery for ventilation, cranes, and other overhead equipment is simple.

Often the shape of the enclosure is such that it has to be designed on the site. Consider the example of a modern high speed printing press. The first step in this noise control problem was to find out what part of the machine made the most noise in relation to the personnel around it. This was found to be the folding and cutting end of the machine where two or three persons are in constant attendance to receive the printed material.

By observation of the mechanical action of the press, the precise area to be enclosed was worked out. Object was to reduce the open area as much as possible. A trial enclosure made of plywood and lined with glass fiber was built by carpenters and cut to fit. The installation is shown in Fig. 7. Later the plywood structure could be removed piece by piece and the pieces used as the pattern to make a more permanent sheet metal structure.

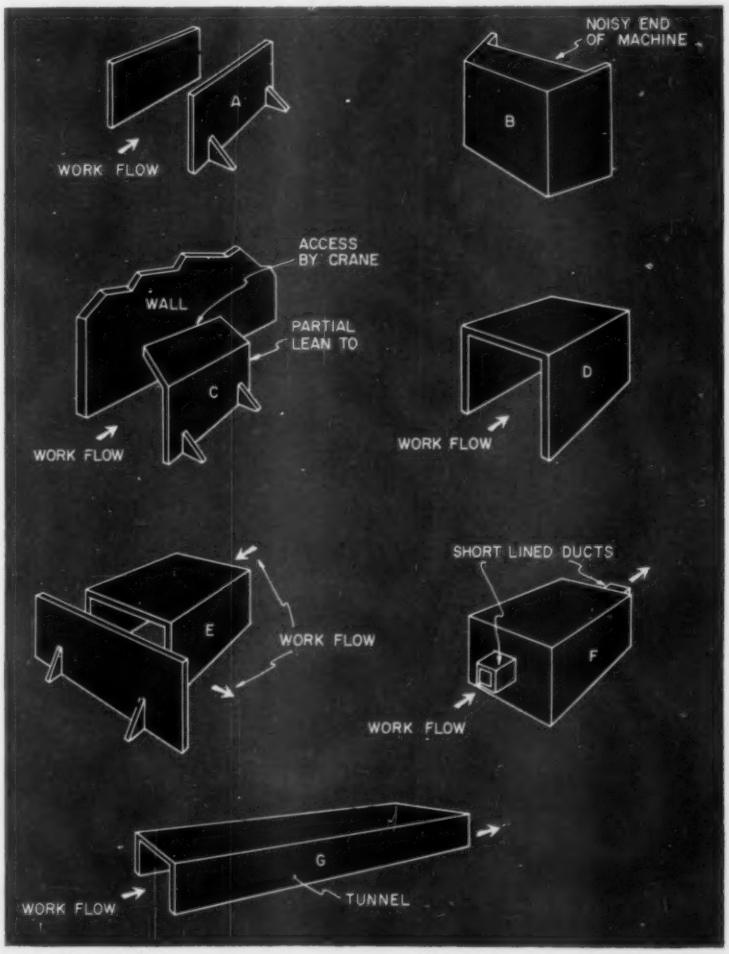
The illustration also shows, in the upper left corner, the use of space absorbers to absorb the general noises in the area. Combination of the two treatments reduced the noise ten decibels for both the workers in the gen-

Table I. Typical absorption coefficients for different types of acoustical materials

	Absorption Coefficient					
Frequencies	125	250	500	1000	2000	4000
Office Acoustical Tile, 1 in.	0.20	0.55	0.74	0.88	0.75	0.70
Acoustical Form Board, 1 in.	0.12	0.38	0.74	0.99	0.88	0.89
Perforated Prefab Acoustical Roof, 3 in. pad	0.30	0.72	0.99	0.96	0.75	0.61
Suspended Acoustical Ceiling, 2½ in. pad	0.50	0.60	0.87	0.98	0.85	0.68

The total number of sabins (absorption units) is obtained by multiplying the area by the absorption coefficient. Two hundred square feet of material of coefficient 0.74 would give 148 sabins. At coefficient 0.99, 200 sq ft would give 198 sabins.

Fig. 5. Types of partial enclosures arranged in order of their ability to reduce noise. The first three—A, B and C—will be greatly improved when used in conjunction with wall treatment or space absorbers of the type shown in Fig. 4



Courtesy: Industrial Sound Control Div., Koppers Company, Inc.

Fig. 6. Partial enclosures constructed of prefabricated panels. These are especially effective when installed in the "shadow" of the wall and with ceiling treatment

Courtesy: R. R. Donnelley & Sons

Fig. 7. Here is an example of a custom-built enclosure, this one for the noisy end of a printing press. Note space absorbers on the ceiling at upper left rear

eral area and those close to the cutting end.

Management will often ask whether the noise problem is one for which personal hearing protection should be provided in the shape of ear plugs, ear muffs, or the like, or should architectural or mechanical noise control be provided. There is no yes-and-no answer for such a situation, but the general principle to be followed can be stated.

Ear protection bears the same relation to personnel hearing safety as welding helmets have to protection from bright light and aspirators to protection from dust. There are certain situations where such equipment becomes a necessity. No safety engineer would recommend that everyone in an automobile assembly line should wear aspirators or ear plugs.

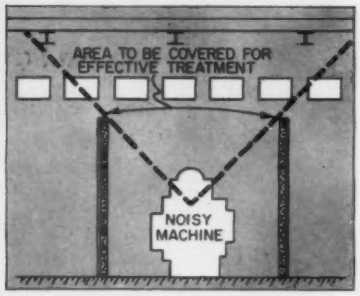


Fig. 8. Partial enclosures without tops are made more effective by use of absorbers. Area covered should be that subtended by the angle shown in sketch

An example of the judicious use of hearing protection in combination with partial enclosures occurred in a paper mill. The couch roll is the source of a very intense siren-like screech. By partially enclosing the part of the paper making machine near the roll with a protective structure, and by using ceiling and wall acoustical materials, the sound was confined near the source, materially reducing it for several hundred workers in the immediate vicinity. From time to time, a worker must go inside the barrier to attend the operation. Under these circumstances he takes down ear muff protectors from a hook near the access opening in the enclosure and hangs them up again on his return.

American industry is entering an era where noise control of plants will become customary just as it has become in offices and restaurants. Use of acoustical materials has much to recommend it, especially when there are impact sounds. Undoubtedly, as the demand increases, better acoustical products will be provided. However, there are enough available today to fit most industrial problems.

Applying Incentives To Maintenance Workers

By F. E. BYRNE, A. C. Lawrence Leather Co., Peabody, Mass.

NOWADAYS a wage incentive program for the maintenance department can be justified by almost any company for wage incentives have proved successful in large companies and in those employing as few as 12 maintenance workers.

In planning such a program, three points should be noted:

1. Mechanical work can be divided into two basic classes: repetitive and non-repetitive; 2. repetitive jobs can be time-studied in their entirety; and 3. non-repetitive jobs consist of checkable and auxiliary work. There is a ratio between auxiliary work and checkable work which can be determined by time study.

The standards of measurement which are to be used must be representative of all types of the working conditions encountered in each individual plant. In any one plant there may be areas which are busy, secluded, dark, dry, wet, or greasy. Maintenance jobs, very similar in nature, may be done in any of these locations, or the same work may be done above, below, or at floor level. Similar work which is studied under all conditions, when averaged to give a standard of measurement, will more nearly be a fair average if the variations caused by working conditions are weighted into the original analysis. As each job is studied and analyzed, it is placed in one of the basic categories—repetitive or non-repetitive.

The repetitive job is studied as a unit and standards set on a per-piece or per-job basis. The working conditions observed on repetitive jobs would be compensated for in the repetitive standard.

Non-repetitive or built-up jobs consist of general repair, new construction, and similar non-recurring types of work and are composed of checkable and auxiliary work. Checkable work is that which is visible and of which the methods, size and amount can be readily seen.

Auxiliary work is that which consists of planning, traveling between the shop and job, obtaining and putting away tools, parts, materials, getting and returning ladders, etc.

For each craft there is a definite ratio between the amount of checkable work and the amount of auxiliary work which was necessary for the accomplishment of the checkable work.

Because the conditions under which maintenance work is performed may fluctuate from job to job and day to day, it is necessary to consider this fact when calculating incentive payments. The work required to remove a pulley which is rusted from a shaft may be considerably more than if the same size pulley were removed where the rust condition was not present.

In order that variations in conditions such as this can be met, a varying adjustment scale is used to adjust the output produced to average conditions. Thus, even though the standards of measurement are set for average conditions, consideration can be given to conditions above or below average.

After time studies of mechanical work are made, analyzed and written, mechanical work can be checked and the standards applied against the work completed to give a level of production for the mechanic under observation.

In order to determine that sufficient standards have been established to adequately and fairly cover mechanical work, a trial check period of two to three weeks is begun. This period is used to test the standards, establish reference information for later comparisons and to complete the training of the mechanical checker, who must see that the work is reported impartially, favoring neither the company nor the mechanic.

As a result of wage-incentive applications, the company gains the advantage of increased productivity through a better utilization of the worker's time by the worker himself; better planning of the work and utilization of manpower; a fast, accurate method of determining mechanical costs; and an accurate record of where its mechanical dollars are spent.

All-Engineers' Luncheon—January 29th

ON JANUARY 29th, at 12 noon, plant engineers from coast to coast will congregate at the Hotel Cleveland, Cleveland, Ohio, to attend the fourth annual All-Engineers' Luncheon. This luncheon is sponsored by the American Institute of Plant Engineers.

This year, the luncheon is being arranged for the second day of the four-day Plant Maintenance and Engineering Show and Conference. If you are planning to attend the show and conference and would like to include the luncheon on your schedule, just fill in the coupon appearing at right and mail it to the address indicated.

The price for the luncheon is $5.00 per person.

American Institute of Plant Engineers
P. O. Box 9304
Pittsburgh 25, Pa.

Kindly send me ..... tickets for the All-Engineers' Luncheon of the American Institute of Plant Engineers to be held at the Hotel Cleveland, Cleveland, Ohio, at 12 noon, on Tuesday, January 29, 1957.

☐ Check ☐ Money Order is enclosed for the reservations indicated above. (Make check or money order payable to the American Institute of Plant Engineers.)

Name _____ Company Address _____

Company _____ City — State _____

Fig. 1. With industrial plants constantly thinking of expanding their facilities, the problem of providing enough parking space for the employees increases. View above shows the facilities of The Natco Mfg. Co., of Richmond, Indiana

Industrial Parking Lots—

Consider These Factors When Planning Plant Parking

By ROGER T. GRAHAM, Harris-Barrier, Inc., Indianapolis, Ind.

ARE YOU planning a parking lot for your plant? If so, there are a number of factors which should be considered when you begin the preliminary planning of the parking area. These are: (1) area of parking lot; (2) car space allotment; (3) location of entrances and exits; (4) lighting and marking; (5) indoctrination of employees in parking procedure; (6) convenience to plant gate; and (7) separate parking facilities. We shall consider these factors at greater length.

Area of parking lot—Ample space should be allocated in the master plan for convenient parking. Consider the growth factors of the plant. At the same time be careful that not too much property is made available for parking as this will tend to cause sloppy parking lot habits to develop which, at a later date, may be difficult to correct.

A parking lot should reflect the attitude of the company in business and should be kept clean. Too much space will present a maintenance problem which is not economically sound. By the same token, too little space will cause crowding within the lot and short tempers among the employees who are either crowded out of a parking space or find it difficult to get to and from their car.

Experience has shown us that a lot of 12,000 sq ft will conveniently park, for industrial purposes, 50 cars. We have further found that if the lot is crowded and spaces are set for 60 cars, that the lot will not park the 60, nor will it park even the 50 cars that can conveniently go into it. More often than not, it will park 40 to 50 cars because of the habits of drivers encroaching upon the next space.

Car space allotment—In laying out the parking lot the first thing to consider on car space allotment is the angle at which the cars are to park and the amount of space to be allocated for each car. In industrial parking with the once a day in and once a day out habits, the best method of parking cars is that of a 90 degree angle, allowing an 8-ft stall space.

If two rows of cars are parked opposite each other using a common driveway, the square footage per car at 90 degree angle, using an 8-ft car stall space, is 240 sq ft per car; at 30 degree angle parking, using an 8-ft car stall, the space used on the base line is 9 ft 3 in. and the total square footage is 260 sq ft per car; at 45 degree angle, using the 8-ft car stall space, the distance on the base line becomes 11 ft 3 in. and the total area per car becomes 305 sq ft.

Angle parking is more convenient than perpendicular or 90 degree parking and is highly recommended for all types of retail or commercial establishments where patrons drive in, park, do their shopping, and drive off.

In industrial parking, the problem is getting the greatest number of cars in the smallest amount of space and still keep everyone happy. For this reason 90 degree parking is recommended with a minimum 8-ft stall space and a maximum of 9 ft. Anything over 9 ft wide at 90 degrees is a complete waste of land.

Location of entrances and exits—Entrances and exits to a parking lot should be laid out so they do not disturb the normal flow of traffic or cause too much crossing over from one lane to another.

If it is possible, the best method is to have traffic make right turns into the lot itself and, in leaving the lot, a right turn into the main artery is preferable. If left turns are necessary from a parking lot to the street, it would be best to provide for two lanes of traffic coming out of the lot, one making left turns, and the other right turns.

In plants working one shift only a single gate would be satisfactory and could be used in the morning for an entrance gate and in the evening for an exit gate. However, where more than one shift works, two gates or

more gates are desirable. If parking is done at any angle other than 90 degrees, it becomes necessary to have a turn around or an island or an exit at the opposite end of the lot from the entrance.

Lighting and marking—Lots should be marked in such a manner that the employees are instructed in their proper parking places and parking procedures. The use of signs directing traffic into and out of lanes and also the angle and direction in which the cars are to park are aids in getting a lot set up properly.

If more than one shift is worked, the lots should have lighting facilities to enable employees to readily find their cars and to eliminate vandalism to the cars parked during the night time hours.

Parking procedure—When opening a new parking area or revamping an existing area it would be wise to send notices to all employees, telling them of the change in the parking procedure. Inform them what gates should be used when coming in and going out, the angles at which they are to park, and the area which is assigned to their particular shift.

Many times engineers have mentioned that the parking lot was designed correctly, but nobody used it in the manner in which it was set up on the drawing board. In most cases the reason is that the employees were not told how to park.

Many plants give new employees a chart of "do's and don't's" and things that are expected from the employee within that particular plant. It might be wise to add one paragraph to the indoctrination booklet, covering the parking lot and the plan or master plan in use within the structure of the corporation.

Convenience to plant gate—It is important that a parking lot be located so that it is convenient to the employees entrance to the plant. In some instances this may not be possible. But, whenever the space is available, it is wise to shuttle employees in and out of the parking lot as quickly as possible with little or no congestion.

Separate parking facilities—If possible, it is best to maintain separate lots for the production and office employees. Quite often starting time for the two groups is different, with the office employees starting at a later time. Space for visitors and vendors should also be provided and located close to the plant entrance.

Time spent in designing and plot planning a parking lot is well spent, and will avoid unnecessary changes at a later date.

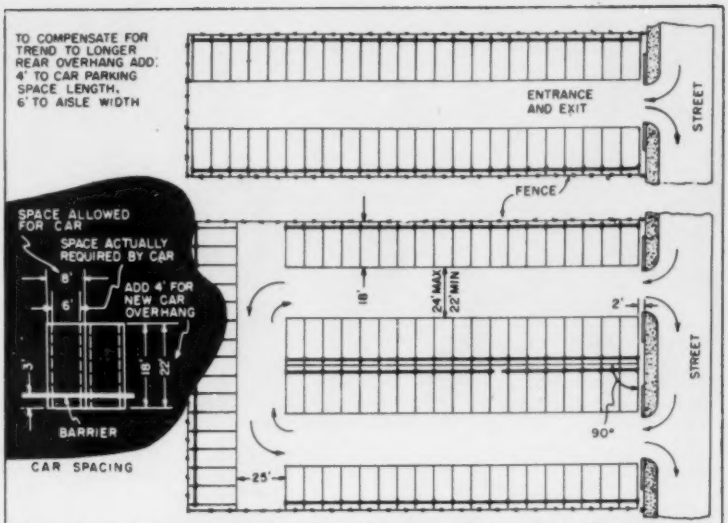


Fig. 2. Suggested arrangement and spacing for a 90 degree angle parking lot

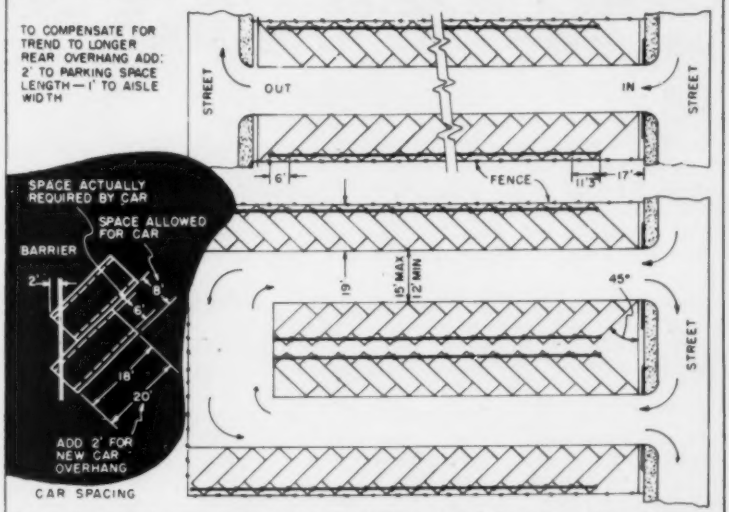


Fig. 3. Suggested arrangement and spacing for a 45 degree angle parking lot

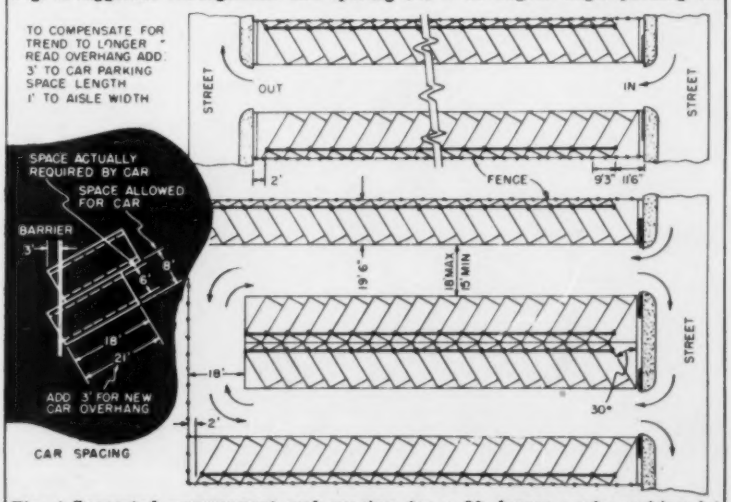


Fig. 4. Suggested arrangement and spacing for a 30 degree angle parking lot

These are the badly spalled and cracked concrete walls at International Salt in Detroit as workmen commence repairs

The same wall, at a slightly different angle, after repairs had been made with this new epoxy-based, polyplastic alloy

Concrete Welding—

Epoxy Compound Makes Water-Tight Patches, Acid and Alkali Resistant

THOSE VERSATILE epoxy-based compounds are still with us; in fact, there seems to be no end to the many plant-wide applications of this family of plastics. One of the latest to be announced is marketed under the name Permagile. It is described as a "new epoxy-based industrial polyplastic."

Most extensive use of the material at the present time has been in the restoration of entire concrete buildings, grain elevators and tanks. It is also being used widely to repair major cracks and gaps in concrete floors, sewers, basements, and interior and exterior walls. Special formulations are available for each of the product's three main functions—joining, filling and cladding.

Perhaps the best explanation for the product's qualities is contained in a report issued by The Gulick Henderson Laboratories, Inc., Flushing, N. Y. In describing certain physical tests and results the laboratory was as enthusiastic as most dispassionate laboratory reports usually permit.

The lab pointed out that a film of the material was used to join trap rock, gravel, marble, granite, brick, concrete block, rubber, wood and tile. All material so joined, the report went on, could not be separated without breaking the parent material regardless of the thickness of the Permagile film joining the materials. Samples of rock and concrete which had been joined together were then placed in boiling water for 5 hr or more and then reexamined. Effect of the boiling, said the report, were completely negative in that there was no discoloration, softening or loss of bond.

Listed in the report, too, were results of hydrostatic tests in which the product was revealed to have equally tenacious properties in resisting water pressure.

In one test a concrete block was coated with Permagile on the outside only. Next a ½ in. pipe was inserted through the side of the block. Openings were then closed and sealed with the material. One day later water was introduced to the inside of the block through the pipe and its pressure was allowed to mount to 40 psi. At this pressure the block ruptured. Neither the seal nor the coating was damaged or leaked, prior to rupture of the block.

Chemical tests also were made on the material and these too showed the Permagile to be possessed of many characteristics desirable in a maintenance material of this type. Accord-

New York City Board of Water Supply used this same material to stop permanently a serious high-pressure leak located 90 ft below water surface in an effluent chamber

Curing of the patch shown in the preceding photograph is hastened by the application of artificial heat. This, in turn, reduced the time that the water was shut off to make repairs

ing to the lab report the material, once set, has the following qualities: 1. It is not water soluble; 2. It is not affected by alkalies; 3. It is non-toxic; 4. It is apparently unaffected by ethyl alcohol, acetone, benzene or zinc sulphate.

Concentrated hydrochloric acid has no apparent affect but in the presence of sulfuric acid the Permagile discolors and softens. In concentrated nitric acid there was general disintegration.

This material, the consistency of paste, is supplied in cans. A catalyst, or liquid reactor, is supplied in a separate container inside the can of Permagile. In mixing, the entire amount of liquid reactor furnished with the container must be added to the basic resin. Both components must be thoroughly mixed for from 3 to 5

minutes. Two types of reactor are available: a standard liquid reactor which is designed for use when surrounding temperatures are no lower than 55 F. In colder weather down to 35 F a special temperature reactor is available.

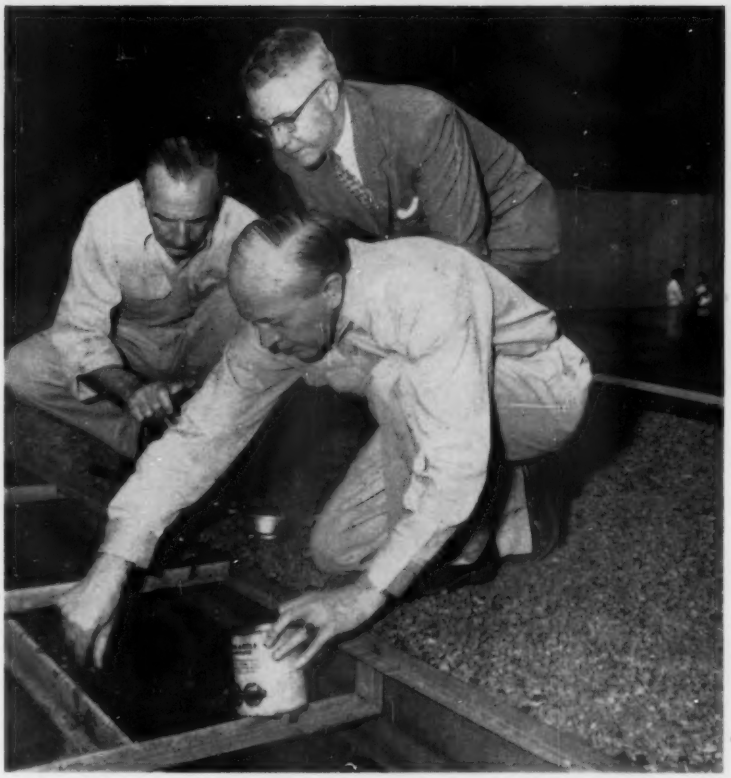
Masonry surfaces to which the material is to be applied must be in proper condition. They should be clean, free of grease, loose particles and efflorescence. Surface must also be dry to assure the best possible attachment.

Depending on temperature, either reactor will cure Permagile within 8 to 12 hr. External heat such as infrared lamps can accelerate curing.

When wide gaps or holes are to be filled excellent results can be obtained, it is pointed out, by combining the Permagile with one part of dry, silicious sand. This makes an excellent mortar of proper consistency.

Want More Information?

If so, either write the Editor, Plant Engineering, 110 S. Dearborn St., Chicago 3, Ill. or use one of the postage-paid cards elsewhere in this issue. Just fill it in and write "Permagile" on the bottom.



John Galvin, building service superintendent at Lever House in New York, watches Herb DeVlaminck, maintenance foreman, waterproof building skylight

Major joints in quarry tile patio at Lever House had been waterproofed with tar, leaving ridges that interfered with game. New plastic remedied situation

Fig. 1. Use of variable speed drive and controls on coil winder means less likelihood of broken wires at start of run

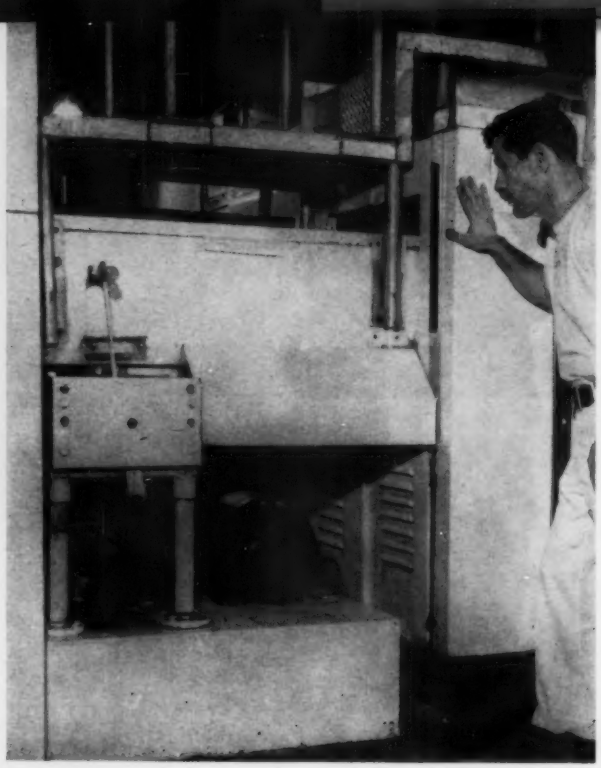


Fig. 2. Drive operates cross conveyor between proofer and ovens, also proofer and oven belts that must vary speed

For Machinery in Need of Precise Control

Adjustable Speed Control Package

USE OF d-c motors with adjustable speed control, that is substantially stepless control over the full range of the motor, is essential or extremely desirable for many operations and manufacturing layouts where machine versatility for diverse products is called for. An individual packaged electric drive, Thy-Mo-Trol, developed by the General Electric Co. is used for this type of application. The drive electronically converts a-c power to d-c and delivers it under close electronic control to a d-c motor. The speed of the latter is controlled by a variable voltage system which permits variable armature and field voltage to increase the speed range and control.

The G.E. Clock and Timer Dept., at its plant at Ashland, Mass., has its Universal Winding Co. coil winders equipped with this type of packaged drive. The coils are used in timing devices, clock motors and so forth. They are not all alike and it is necessary to run the winders at different, accurately controlled speeds for different coils. Another reason for d-c operation of the winders is that it makes possible a smooth, slow start and gradual rise to production speed.

In this operation 18 coils are wound simultaneously on the same spindle, see Fig. 1. Without the slow starting any, or all, of the 18 wires being fed on to the spindle are liable to break and cause a great deal of trouble. Once the speed of winding has been set it is not changed for the run, but should there be any trouble, the machine can easily be slowed to a very low speed to determine the cause of the difficulty.

This application is typical of what adjustable speed control can mean in the way of making a machine versatile enough to do a variety of work. These packaged drives are compact and easy to maintain. The control equipment is in a separate package that can be installed in any convenient location. Only the operator's controls, usually pushbuttons and the drive motor need be placed at the driven machine.

Speed ranges of 1 : 100 may be had, and sometimes more. Operating speed may be preset, so that after starting, the motor will accelerate the machine gradually and smoothly up to the preset speed. It is also possible to have more than one preset speed. The operator may change from one speed to another by pushing buttons. The drive provides an adjustable acceleration rate, controlled by means of current limits, which will bring the machine up to speed at the rate best suited for a particular load.

Jogging and creep speeds can also be provided. Thus by button control the drive can be turned a little at a time for jogging, or continuously at a very low speed for creeping.

Among the advantages of stepless speed control is that the speed of a machine can be quickly adapted to the production set-up which may be changed from time to time by technological developments, changes in product design, the skill of a particular operator or the desired quality of the product being turned out. The packaged drive can frequently be easily installed on machines in place of constant speed motors, modernizing them at minimum expense. Adjustable speed drives can also be used to co-ordinate the rate of flow of various items to an assembly line in accordance with the speed of the latter, or the delivery of units to a single machine can be timed to its operating speed.

An interesting example of the ap-

(Continued on page 190)

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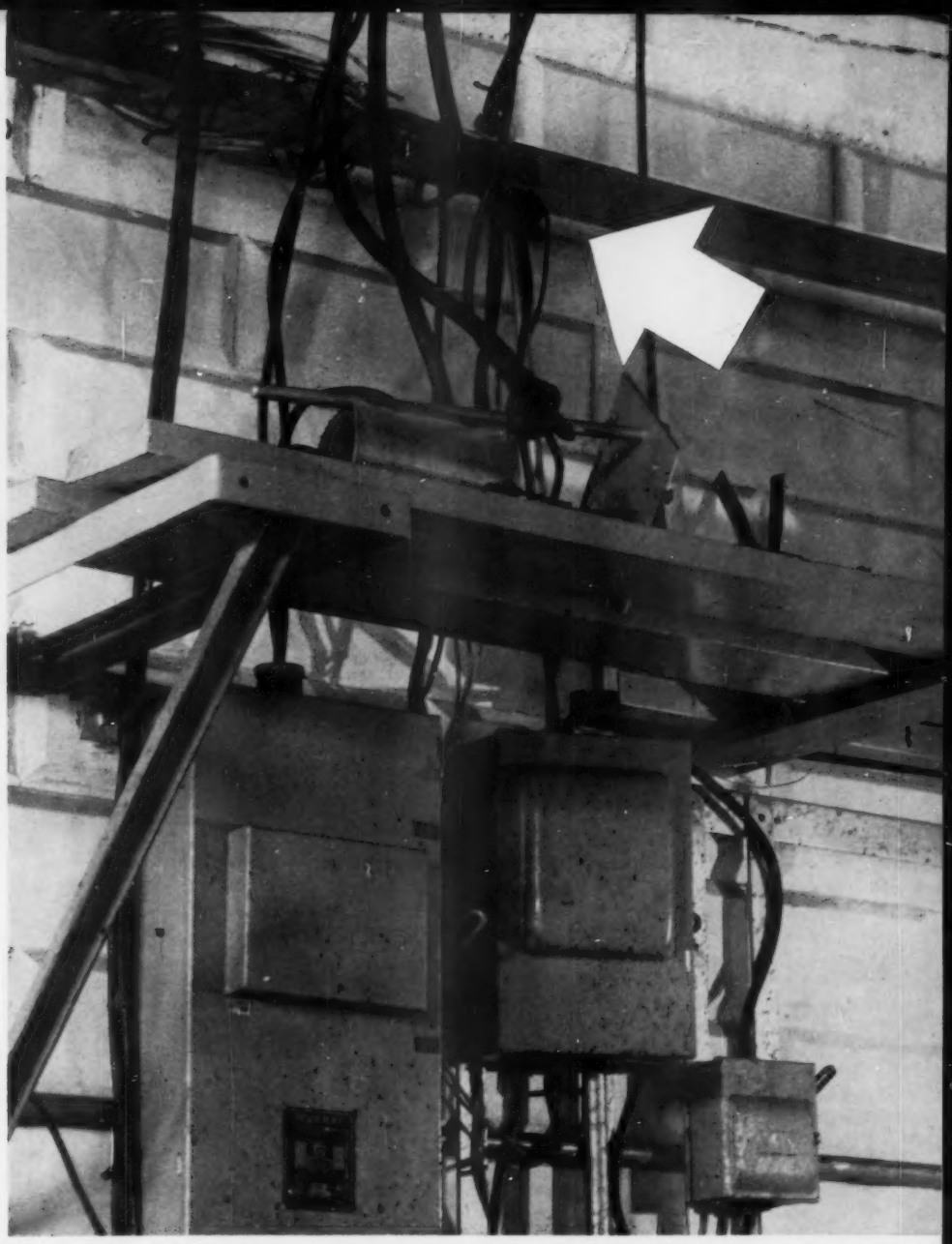


Fig. 1. When wires are draped over metal, arrow, even a minute break can electrify metal structure over great distances. Person, on grounded surface, touching the metal may get fatal shock. Wiring should be in well-grounded conduit—shielded

Plant Electrical System Hazards

Distribution Lines, Equipment May Harbor Trouble Spots

By ROBERT S. WILSON, Senior Electrical Engineer, California Packing Corp., San Francisco, Calif.

ELECTRICITY CAN MAKE its presence known in many ways when it is moving—lamps light, heaters get warm and motors run—but when it is at rest it is like a snake, silent and ready to strike instantly. Electricity can be found in dangerous quantities on objects not connected by electric wires. Clouds, moving belts and unshorted electric condensers (capacitors) may accumulate dangerously high voltages.

In practically any plant the personnel stand on or touch "grounded surfaces" such as concrete, steel, or wet wood or earth. These surfaces form one side of an electric circuit and the person in contact with such surfaces becomes part of the circuit. Hereafter "grounded surfaces" will be simply referred to as ground.

It is possible to find a difference of electrical potential (voltage) between ground and any other object not solid-

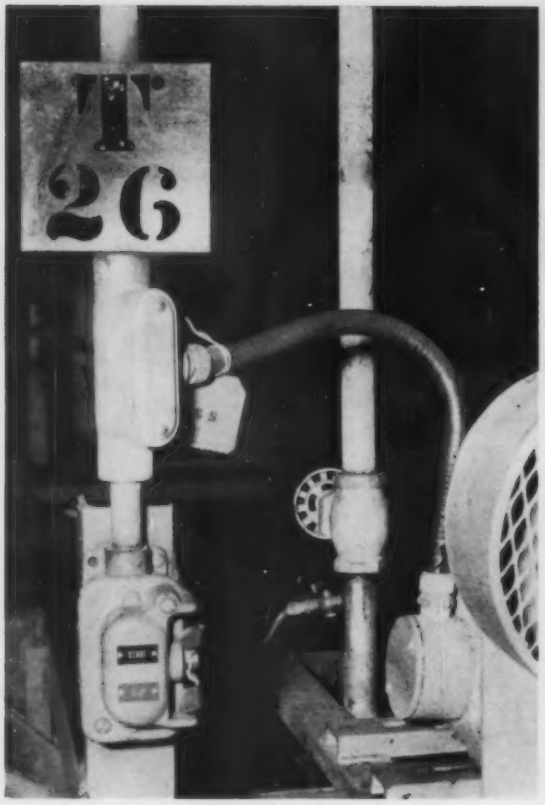


Fig. 2. Circuit should be marked at operating station

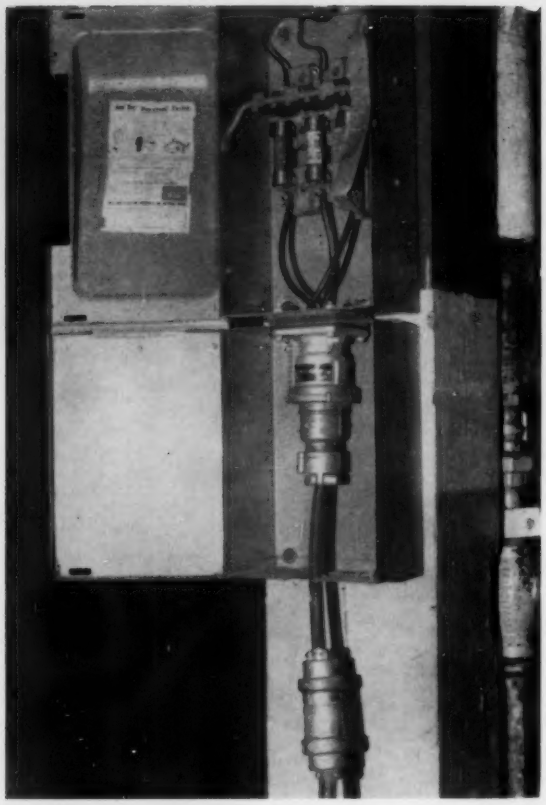


Fig. 3. Adapter use, open-door are examples of bad practice

ly connected to ground. Fortunately, with most objects this voltage is so low that a person cannot detect it through his skin.

When we use electricity at practical voltages (for power and light) it is customary to find that some part of the electrical circuit has been connected to ground. The wires which come to a switch, motor or lamp then have a relatively high voltage between them and ground.

Defective Insulation

When the insulation on such wires or equipment breaks down and the voltage leaks to isolated metal parts of the building or machinery, such charged parts become as dangerous to the man standing on the ground as the bare electric wire itself. As was written in the paper "Milliamperes Can Kill You,"[1] it takes only a small amount of current to kill. Under certain conditions, as low as six volts will cause sufficient current to flow to be lethal.

Electric wires not installed in conduit must be sufficiently high above grounded surfaces that a person standing on the grounded surface cannot touch them. The insulation on open wires lashed to or lying on metal members can be worn through by vibration, thus electrifying ungrounded metal parts for great distances. See Fig. 1. Such wires should be properly mounted on suitable electrical insulators.

Subjects of voltage-to-ground, insulation, and grounding are complex and probably occupy the most important parts of electrical safety rules. Rules for installing electric wiring and the use of electricity are prepared for your safety.[2]

An electrical installation may be in excellent condition with all proper precautions provided for the safety of workers, but if certain operating procedures are not observed injury or death is very likely to result.

All electric switches and panel boards should be provided with locks or places to insert padlocks, Fig. 4. Motor control centers should not be entered by anyone except qualified authorized electricians. The doors should be kept locked at all times. Any controls such as reset buttons or control devices are placed on the outside of cabinets for the operator's use. If trouble develops the relays are inside to protect motors and wiring. They should not be tampered with by the operator. To enter such cabinets with all the terminals exposed is simply inviting disaster. When a man is working on a circuit which he has disconnected he should place a padlock on the open switch so that it cannot be closed while he is working on the line. Plant rules should prohibit anyone else from removing the lock.

Adapter Plugs

Do not permit electric safeguards to be defeated by removing interlocks between switch handles and doors, or by using adapter plugs which will permit breaking the circuit while under load in an operator's hand, just to save a few steps back to the switch. See Fig. 3.

Remember that manual motor starters do not open themselves when a power failure occurs. When power is restored the machine will start if the stop button has not been depressed. If there is any possibility that a worker can get his hand into the machine to clean or work on it, Fig. 5, install a

1. Bassett, Gurney & Martin, AIEE Conference Paper No. CP-55-644, "Milliamperes Can Kill You," American Institute of Electrical Engineers, 33 West 39th St., New York 18, N. Y.

2. National Electric Code, National Board of Fire Underwriters, 85 John Street, New York 38, N. Y.

Fig. 4. Switches should be "off", locked prior to repairs

Fig. 5. To work when the power fails, push "stop" button

magnetic starter and be sure the switch is locked open.

All circuits should be clearly and permanently marked both at the control point and the panel to show which panel and circuit serves the equipment, Figs. 2 and 8. Failure to do this has caused serious accidents. It is a convenience to number light fixtures and outlets the same way.

The switch controlling capacitors which are not connected to motor terminals should be clearly marked with a conspicuous sign such as:

"Capacitor Switch — Allow one minute after opening switch and test with voltmeter before touching any wires or fuses."

This is to be sure that the capacitor has been discharged to a safe voltage.

Maintain legal clearances in front

Fig. 5a. Discourage starter tampering

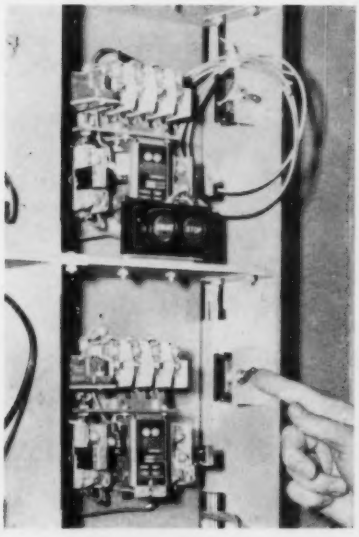


Fig. 6. Use of "buddy" system on electrical jobs can pay off in an emergency case

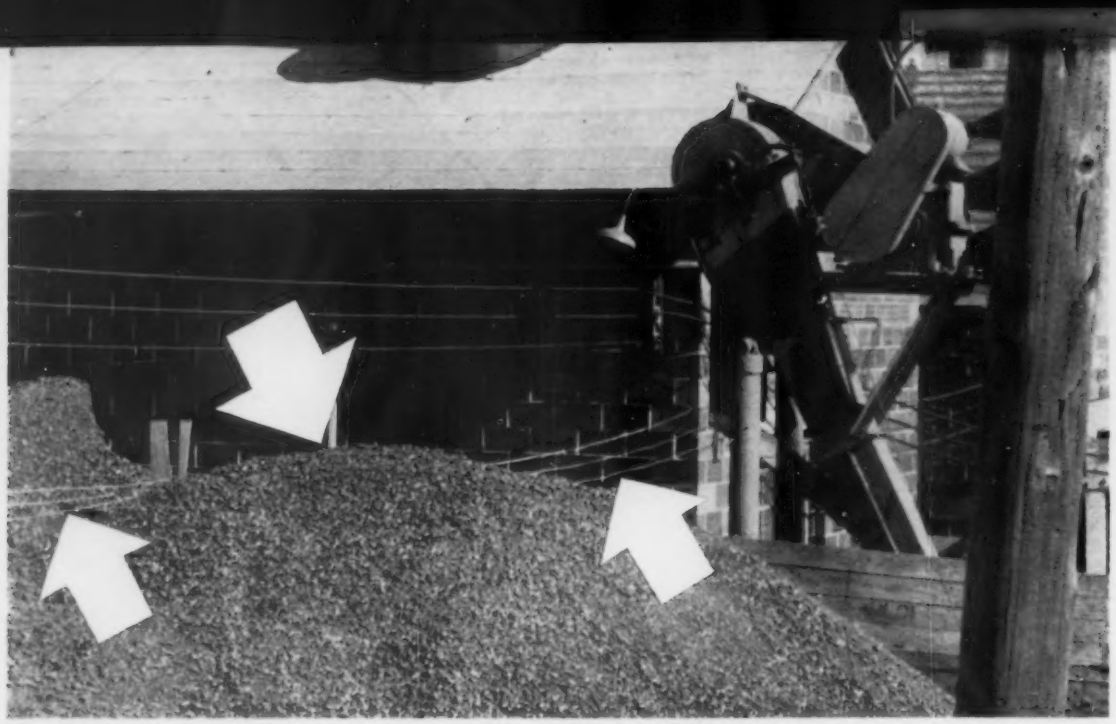


Fig. 7. Electrical lines run through the coal pile. Aerial wires should be high enough to prevent possible accidental contact

of panels at all times. Do not permit switch handles or operating devices to be placed over six feet, six inches (6′-6″) above operating platform. Under normal conditions there is likely to be no one at the panel, but when an emergency does arise safety and accessibility are paramount. Do not forget that in case of an accident an injured person may have to be removed. Provide safe access to panels.

Whenever possible, and especially if there is any chance of a worker or piece of equipment falling, have at least two men working together, Fig. 6. In case of an accident someone else is then nearby to aid the victim.

To summarize:

1. Always test a "dead" circuit with a voltmeter before touching it.
2. Keep panels and switches locked.
3. Allow only qualified authorized people to work on electrical equipment.
4. Do not defeat safety precautions.
5. Mark all circuits.
6. Maintain safe clearances and good housekeeping around electrical equipment.
7. Do not work alone.

Fig. 8. Push button numbers correspond with the ones at the operating positions

Fig. 9. Inadequate clearance, bad maintenance are potential troublemakers

Fig. 10. Supervisory personnel should promote use of locks, safe practices

Fig. 1. Vertical storage racks hold bar stock horizontally as well as vertically, segregated by size and type of metal

Fig. 2. Closeup of rack face shows construction, with sheet steel sheathing protecting edges. Tags indicate stock sizes

"Tepee" Rack
For Bar Stock Storage

SPACE SAVERS are the four shop-fabricated "tepee" stock racks which supply machining sections at Minneapolis-Honeywell Regulator Company's Appliance Controls Division in Gardena, California.

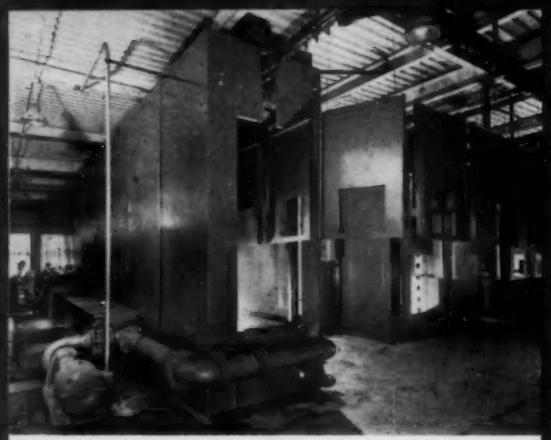
Their ten-degree-angled sides channeled for bars and shapes up to 15 ft in length, and shelved inside the triangle, the tepee stocks material both vertically and horizontally—yet takes up only about one-third the space of more conventional storage racks.

The racks are six feet wide at the base, tapering to three feet across the top, which stands 10 ft above the production floor. In depth, the racks range from 12 to 14 ft.

Basing his decision on the value of a square foot of production area—in this case, $7.50 per sq ft—plant engineer Burke Wombacher chose to store material vertically.

Big factor in the chosen design was the ease of handling long stock lengths. Segregated by channels, various sizes and types can be stored and easily withdrawn. Vertical storage, leaning the rods against the rack, permits ready inspection of each bar over its entire length.

1 Metal panels being loaded onto 1300-ft conveyor on their way to the three-stage phosphatizing tank



2 Panels enter phosphatizing tank where they are treated in 188-ft unit to provide a good paint bond

From 100 Painting Hours Down to 40

New Line Eliminates Bottlenecks, Improves Quality

By CURT HOERIG, Asst. to Vice Pres./Manufacturing, Mueller Climatrol

LIKE A BAD SPOT in an apple, a major production line bottleneck is something to be excised with speed, planning, and imagination. Mueller Crimatrol, a 100-year-old Milwaukee manufacturer of domestic furnaces and air conditioners, came to this conclusion when its own "bad spot" showed up—an antiquated batch-lot painting line. Production was in good shape elsewhere in the plant but even with two 50-hr painting shifts things were proceeding from bad to impossible. Now that the new electro-static line is in, painting time has been cut to one 40-hr shift per week.

Here's the Installation

Shown in the accompanying isometric diagram and the photographs are the major features of the new system. The cleaning and phosphatizing unit is 88 ft long and consists of three stages. Washer is U-shaped with second and third stages side-by-side; this arrangement saves space as well as cutting heat loss. First stage cleans and phosphatizes; second stage is a clear water rinse. Third stage is a chromic rinse.

Three units make up the electrostatic paint installation. When the parts in process leave the cleaning and phosphatizing section they are conveyed to the painting zone where paint is applied automatically by the three Ransburg units. Each unit consists of a 15-in. disc revolving at 3600 rpm; as it revolves it also moves up and down the necessary predetermined distance.

Paint is pumped onto this disc at predetermined rates and is, at the same time, charged with a 95,000-volt potential. Charged paint particles leaving the periphery of the disc are attracted to the parts passing on the conveyor.

Changeover from one color to another takes between three and four minutes. Mueller retained two of its old hand-spray, water-wash booths and a double-batch oven to take care of the always-present "cats and dogs." These parts are cleaned and phosphatized either at the start of the shift or at the end—or during a color change.

Following a brief air-dry period the painted parts enter the baking oven. Here they take 20 minutes to traverse the serpentine path inside the oven. This paint baking oven is, incidentally, located outdoors adjacent to the finishing department. Several factors prevented its location elsewhere. There was no floor room or ceiling room inside the building. The roof was given some thought as a possible location but the weight of the installation was a deterring factor. Another was the degree of conveyor incline that would be needed to get the product up to the roof and then down again.

After a 20 minute bake—30 feet of conveyor in the oven in five passes at 310 F—the painted panels pass through a cooling zone. Then the conveyor moves to the assembly department where the work is unloaded and secondary operations such as attaching insulation, nameplates, door handles, decals are performed in line with the conveyor to eliminate handling. The finished parts are now stored at the packing line, the unit assembly line or placed on shop trucks to be moved to other assembly lines in the plant.

Smooth Integration

Finishing systems are certainly not unique. What makes this one interesting is the smoothness with which it was integrated into the plant.

We had to put it into the present area and we couldn't shut down for the changeover without shutting the whole plant down.

Production continued throughout the installation of the new equipment. By careful scheduling of both contractors' work and production spraying and the use of canvas drops between operations, it was possible to continue spraying up to one week before completion of the installation. The last week they transferred the first shift sprayers to the third shift temporarily while the second shift remained on their regular shift and continued production.

3 Drying oven bakes out all moisture before part moves on to cooling, painting zones in next photo

4 All colors of paint are applied at these three electrostatic paint spray booths. Next comes bake oven

Final welding and erection was done on the first shift and equipment checked out during this week. The following Monday morning the second and third shifts were eliminated and the new installation was started on the first shift.

Our paint vendors, The Glidden Company and the Interchemical Corp., meanwhile ran tests on our parts at the Ransburg laboratories to correctly formulate our paint. We inspected and approved these while fabrication of the equipment was going on. We did likewise on cleaning and phosphatizing quality with the Detrex Corporation.

Installation work was broken down into plumbing, electrical, iron work, sheet metal and masonry. Bids from local contractors were obtained and a schedule set up to keep all working at the same time, yet out of each other's way—and, with the least interference with production, which was proceeding on the old equipment.

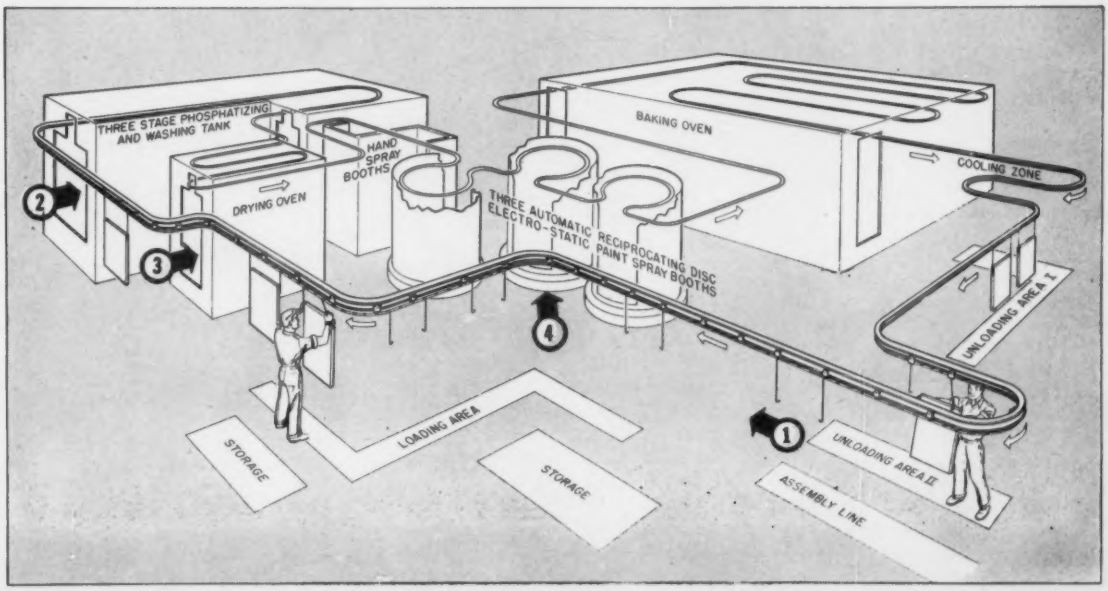
In order to properly hang parts on the conveyor, we installed a temporary length of chain in our sheet metal department to try out hanging. We changed patterns to add holes where necessary.

The culmination came on the day we had picked to start the new system. It was most gratifying to see that everything started without a hitch. We were turning out satisfactory quality within an hour after starting and haven't had to stop since. Adjustments and corrections were so minor they didn't interrupt production.

Typically now a production run of 400 sets of furnace casings which formerly took 200 man hours to clean and spray, now takes 60 hours. The 24 men who averaged 50 hours per week are now replaced by 10 who average 40 hours. Production is all handled on one shift with the whole second shift available for an increased load.

Paint mileage has increased over 40 per cent on the outside finish.

Isometric drawing of the new paint line installation. Numbers indicate position from which photos above were taken



Q and A on Pump Problems

Questions Answered on Throttling, Brine System, Shaft Sleeves, Etc.

By IGOR J. KARASSIK, Worthington Corp.

CAN A CENTRIFUGAL pump be operated against a closed discharge? Can we reduce the capacity of a pump by throttling the suction or the discharge? We are planning to locate the brine circulating pump beyond the cooler. Are any troubles likely to develop?

These questions along with suggested solutions appear below. Possibly some of the solutions cited here may help correct a pump problem you are having in your plant.

Question: We have a 6 in. discharge single stage centrifugal pump driven at constant speed by a squirrel-cage motor, operating on general service. It is presently delivering 1600 gpm at a total head of 160 ft.

We find that we could do with considerably less water, say 1300 gpm. Since the pump speed cannot be changed, we can reduce the capacity by throttling either the discharge or the suction of the pump. Will this reduce the power consumption of the pump and can we obtain a greater reduction by throttling the suction or the discharge?

Answer: A centrifugal pump operating at constant speed will deliver a capacity corresponding to the intersection of its head-capacity curve and of the system-head curve of the system in which it is operating. The system-head curve itself is made up of the sum of the static and pressure heads and of the friction losses at various capacities.

In illustration, a system-head curve has been superimposed on a pump head-capacity curve for conditions given in the question. It has been assumed that the static and pressure head are 130 ft and that the friction losses at 1600 gpm are at 30 ft.

It will be seen that the head-capacity curve at 1300 gpm is well in excess of the system-head at that capacity. It is possible, however, to introduce artificial friction losses by throttling, resulting in a new system-head curve which now intersects the head-capacity curve at 1300 gpm, and 176 ft total head. The power consumption will have been reduced from 77.5 to 70 hp.

It is never recommended to throttle the pump suction in order to reduce pump capacity, as the effect is to change the pump head-capacity curve through cavitation and operation in the so-called "break." The pump efficiency is seriously affected in such an operation, but most important is the erosion and premature destruction caused by a cavitation which would reduce pump capacity drastically.

A much better solution than even throttling the pump discharge is available if a permanent reduction in capacity is desired. The pump impeller can be cut down—in this case by approximately 7 per cent—so that the pump head-capacity curve will pass through the point of 1300 gpm and 150 ft, to intersect with the present system-head curve. The power consumption should be approximately 59 hp as compared with the 70 hp obtained by throttling the discharge.

Brine System

Question: We are laying out a brine system in which the receiver for the warm brine return which acts as the surge tank is located about 25 ft above the shell and tube brine cooler. The arrangement in the plant is such that it would be more convenient to install the brine circulating pump, which is a centrifugal unit, beyond the cooler so that it will handle cold brine.

Are there any troubles likely to develop because of this location and why is it customary to install the brine circulating pump ahead of the cooler?

Answer: The handling of cold brine which results from locating the circulating pump beyond the brine cooler introduces both hydraulic and mechanical complications which are best avoided. When the pump takes its suction directly from the surge tank, it operates with the maximum available head on suction.

If the pump is located beyond the cooler, the suction head is reduced by the amount of the friction losses in the cooler, and depending upon the magnitude of these losses, the pump may have to operate with a suction lift.

Any excessive fouling of the cooler tubes will increase the friction losses to an extent that the suction lift may become higher than permissible for the required capacity and the pump may be subjected to cavitation. This will restrict the available capacity, cause noisy operation and reduce the life of the pump through wear of the impeller.

Another unfavorable effect from handling cold brine is the increase in power consumption. At lower temperatures, the viscosity of the brine increases very rapidly and reduces pump efficiency to an appreciable extent. On the other hand, the effect of viscosity on pump efficiency when the brine handled is warm is almost negligible. In addition, a lowered efficiency means more heat dissipated in the pump and, therefore, more heat added to the brine handled by the pump. This reduces the effectiveness of the cooler and of the cooling system.

Mechanical problems introduced by handling the cold brine instead of having the pump take its suction directly from the warm brine return tank, center at the bearings. Of course, for either location, the temperature of the brine will be below the freezing temperature of water. The bearings of a brine pump are therefore provided with a seal which will prevent or at least reduce the tendency of the moisture in the surrounding atmosphere to enter and condense inside the bearing housings.

Likewise, select a lubricant which will give satisfactory service at the prevailing low temperatures. Both these problems are magnified when the pump takes its suction from the cooler. It may become necessary to circulate warm water through the jackets of the bearing housings (if such are provided) or possibly to locate electric heating coils within the bearing housings.

After weighing all of these factors it would appear that these problems are not completely insurmountable; however, the advantages of handling warm brine are sufficient to provide an incentive to reexamine installation plans.

Question: We have a water supply installation which consists of three 8-in. single stage, double suction centrifugal pumps, handling 3000 gpm each against 100 psig discharge pressure and operating under a 12-ft lift. The water handled contains a considerable quantity of fine silt, and we find that the life of the shaft sleeves is very short.

We originally used bronze sleeves but later changed to a 13 per cent chrome stainless material and although this has lengthened the life of the sleeves, we still find it necessary to replace sleeves about every three months. Is there a sleeve material available which would improve this life still further?

We have a very adequate machine shop and would like to know whether it is possible to regrind shaft sleeves to re-use them. How much metal can be removed from these sleeves without jeopardizing their operation?

Answer: While the use of material even harder than 13 per cent chrome stainless steel would probably require less frequent replacement, the most logical solution would be the prevention of erosion of the sleeves by the silt in the water handled. Since the pumps are operating under a suction lift, the pumps are probably provided with seal cages in the stuffing boxes to prevent in-leakage of air.

Normally, water under pressure is piped to the chamber formed by the seal cage and makes an effective seal which prevents air from passing into the pump. This seal chamber also provides a reservoir of liquid to cool and lubricate the packing rings.

The flow of the liquid pumped into the stuffing box and out to the atmosphere should be avoided when handling inflammable liquids or, as here, when the water handled erodes the shaft sleeves. In such cases, the seal cages can be used to introduce a sealing liquid to prevent this outflow.

In this case, clear water under pressure should be piped to the seal cages. In the event that no clear water source is readily available, it may be possible to install a small strainer or filter in a line from the discharge of the pumps. Generally such strainers have a reasonable friction drop and the 100 psig discharge pressure is more than sufficient to provide the required sealing water.

In order that the clear water may flow freely into the pump interior, and keep the packing free from the abrasives contained in the water pumped, it will be preferable to locate the seal cage as close to the pump interior as possible. For instance if the stuffing boxes have six rings of packing in addition to the seal cage, it might be best to install two rings of packing at the bottom of the stuffing box. Follow this with the seal cage and then with four more rings. Make sure that the water seal cage is located directly underneath the supply connection. It may be necessary to drill a new connection and plug the old one.

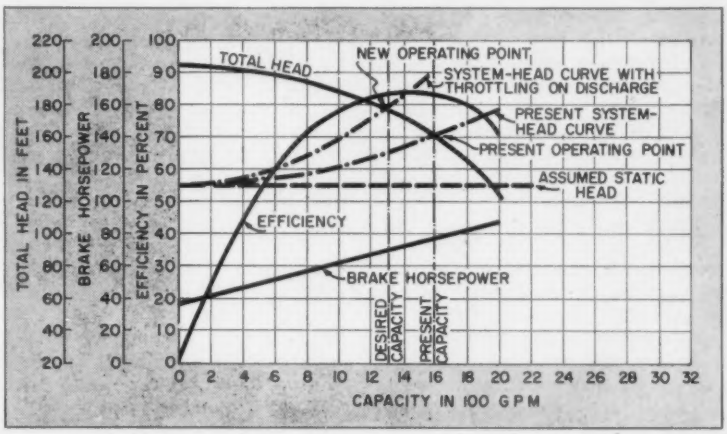
When regrinding shaft sleeves for reuse, it is extremely important to insure concentricity of grinding, as any eccentricity in a shaft sleeve will accelerate wear. If the wear and grooving of the sleeve is of a minor nature, say under 1/32 in., the sleeve can be refinished by grinding it slightly undersize. When the sleeve is so repaired, the clearance at the bottom of the stuffing box between the sleeve and the casing or throat bushing should be checked to see that the packing will not be pushed through the enlarged space into the pump when the glands are tightened.

Question: Can a centrifugal pump be operated against a closed discharge?

Answer: Generally, this should be avoided, although there are some special cases when no significant harm can occur.

The difference between the horsepower consumed by a centrifugal pump and the useful water horsepower corresponds to the power losses within the pump. Except for a very small portion of these losses, this difference in power is converted into heat which is transferred to the liquid which passes through the pump. When the pump operates with a closed discharge, no useful power is generated and the entire brake horsepower delivered to the pump is converted into heat. As no flow takes place through the pump, this heat goes into the small quantity of liquid within the pump casing.

The temperature rise of the liquid in the casing can be easily calculated. One horsepower converted into heat corresponds to 42.4 Btu's per minute. If the pump takes 100 bhp at shutoff, 4240 Btu's will be transferred to the liquid each minute. If the pump contains 100 lb of water (specific heat = 1 Btu/lb/F), the temperature of this water will rise at the rate of 42.4 per minute and serious damage can result if the pump is allowed to operate against a closed discharge for any appreciable period of time.



To answer the question about reducing the pump's capacity by throttling the suction or discharge, a system-head curve has been superimposed on the pump head capacity curve for the conditions given. It is assumed that static and pressure head are at 130 ft and that friction losses at 1600 gpm are at 30 ft

On the other hand, if we have to deal with a large high-capacity and low head pump, the volume of water contained in the casing will be very large and the temperature of this water will increase very slowly.

For instance, if we assume the same 100 bhp at shut-off, but consider a pump whose casing contains 5000 lb of water, the temperature rise will be only 0.85 F per minute and such a pump could operate for quite a long time—say 15 to 30 minutes—with the discharge valve closed, without causing undue difficulty.

In general, however, the operation of centrifugal pumps with a closed discharge or against a closed check valve is not recommended. If the conditions of installation impose such an operation, a small by-pass should be provided between the pump and its check valve, so that a reasonable amount of flow will take place through the pump even when its discharge is closed off.

Fluid Power Maintenance

IV. How to Care for Hydraulic Pumps

What kinds of pumps are used? . . . What are the causes of pump failure? . . . What are the recommended methods of isolating causes of pump failure when troubleshooting? . . . What do you do to lengthen the life of hydraulic pumps? . . . These questions are answered by the authors

By H. L. STEWART and J. M. MORITZ, Logansport Machine Co., Inc.

HEART OF THE hydraulic system is the pump. Success or failure of the hydraulic system is dependent largely upon the capability of the pump to deliver the fluid to the system day after day without failure. While hydraulic pumps as used as industrial applications are ruggedly built, they must be properly maintained if full efficiency is to be expected. It should be remembered that many machined parts in pumps must be held to tolerances within 0.0001 in.

There are hydraulic pumps of several designs such as the gear, vane, rotary piston, reciprocating piston and screw types. We find these made as single units—which are by far the most common—double units, combination units, and two stage units. Each has its advantages and limitations.

For example, a single unit such as a gear or vane type pump, is advantageous from a price standpoint. A combination unit (two pumps with built-in relief and unloading valves for delivery of a large volume of oil at low pressure and a low volume of oil at high pressure) finds considerable use on press circuits and such. Excessive heat can be eliminated with such a combination during long-holding periods.

Choice of the proper pump, by the designer of the hydraulic system, often reduces the work of the plant engineering group. Many trouble-jobs can often be traced back to poor judgment in selection of the pump.

While hydraulic motors are used at the opposite end of the circuit from that of the pump, their design is practically identical to that of a pump. The hydraulic motor provides rotary motion, while the hydraulic cylinder produces linear or angular motion. The hydraulic motor and the hydraulic cylinder are often used in the same circuit. Hydraulic motors are also used as flow dividers by coupling two or more together as shown in Fig. 1. A chain drive is used to connect all four motors. This allows for an approximate equal flow of oil from each of the outlet ports of the motors.

Any one of a number of things may cause a hydraulic pump to fail in operation. Here are some of the causes:

1. Dirt or foreign matter. Here again, as in other components of a hydraulic system, dirt or foreign matter causes failure. By employing proper intake filters, dirt should not be a problem. The filter should pick up and hold any small particles that might be held in suspension in the oil.

What often happens is that someone removes the filter, then operates the pump without any filtering action to the oil. It doesn't take long for the dirt to work its way through the precision parts of the pump. The result: Excessive wear in the mating parts; abnormal internal leakage; broken internal parts; and seizing and freezing or the unit.

Foreign matter such as water can enter the pump even though the pump line is equipped with a good intake filter. Presence of water may be caused by condensation or it may be splashed into the reservoir. Coolants or cutting oil may get into the reservoir. Or, a poor grade of hydraulic oil may break down and deposit varnish and other contaminants on the pump parts. These deposits may cause pitting, rusting, and eventually complete breakdown of the pump.

2. Misalignment of the pump shaft. While this condition should never exist, if care is used in installation, it is a rather common cause of pump failure. Misalignment causes wear on the pump bearings and other internal parts, excessive heat within the pump, high noise level, and seal failure.

3. Excessive operating temperature. Operating temperature of the oil in the oil reservoir should not exceed the recommended range as prescribed by the pump manufacturer. High oil temperature will greatly reduce the viscosity of the oil, cause residue deposits in the pump, cause seals to cure to the extent that they will not perfect a seal, and will cause lubricant to leak out of bearings. Heat has been known to cause a pump to seize and quickly ruin the finish of the internal working parts.

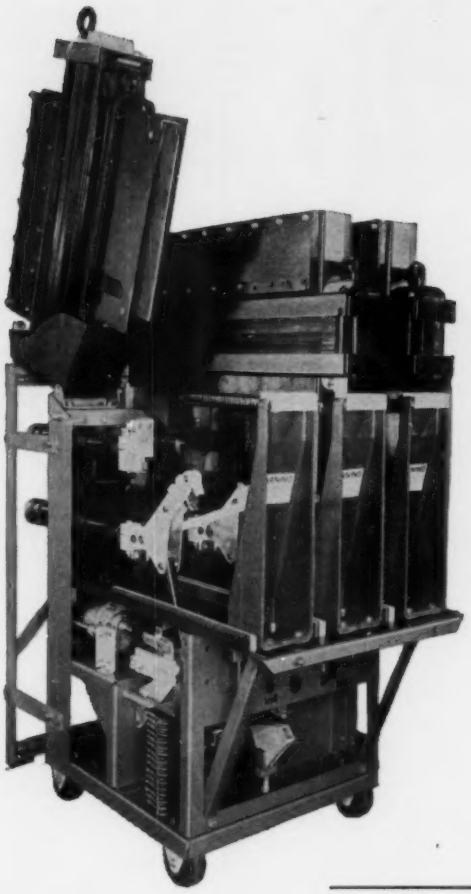
4. Excessive operating pressure. When a hydraulic system is designed, it is calculated for a certain operating pressure, but by the time it is put in operation, the requirements may have changed to the extent that the operating pressure must be greatly increased. Here is where one runs into considerable pump trouble; i.e. operating the pump well in excess of its intended maximum pressure. Pump failure is also caused by operating a pump at speeds greater than that for which it is designed. Don't operate a pump at 1800 rpm if it is designed only for 1200 rpm.

5. Cavitation. Cavitation is defined as a partial vacuum in a fluid about a rapidly revolving impeller. Cavitation may be caused by a clogged intake filter, an intake filter of insufficient size, or an intake line to the pump of insufficient size. A very high noise level is created by cavitation—something like a lot of ball bearings being shaken violently in a can. To check for cavitation, either clean the intake filter or change it. If this does not overcome the noise, then check the intake line and the size of the filter.

Some technicians remove the filter and operate the pump to check for cavitation noise, but you are always taking a chance of allowing dirt to contaminate the pump. Clogged air vent in the oil reservoir is also a cause of cavitation.

As soon as cavitation is discovered, the pump should be immediately shut down or its life may be shortened.

6. Air. Air in the system will also cause noise and pump trouble. Air can be caused by low oil level, improper baffles in the reservoir, leaks in the



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7.5HV-250	1200-2000	7.2	250
7.5HV-500	1200-2000	7.2	500
15HV-150	600-1200	13.8	150
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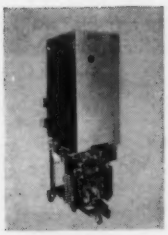

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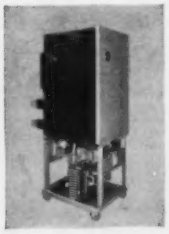

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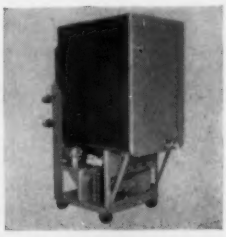

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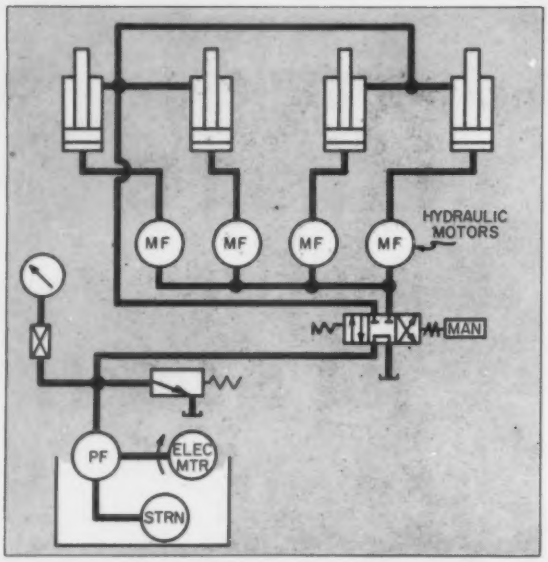

Fig. 1. Hydraulic motors are often used as flow dividers, as shown. They are coupled together by means of a chain drive

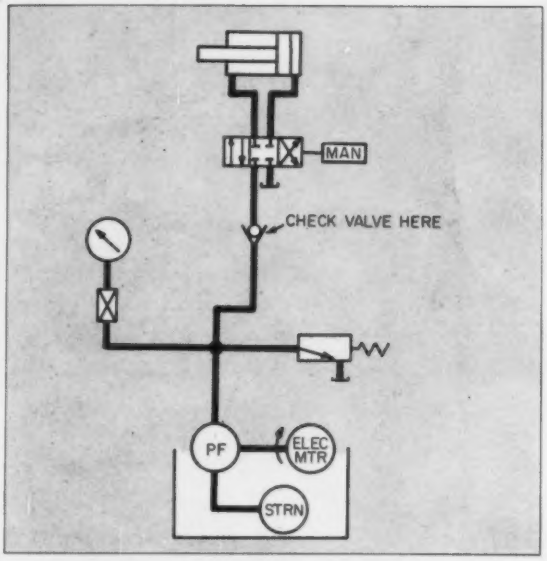

Fig. 2. If air in a hydraulic system is caused by head pressure, then a check valve should be installed as shown here

intake line, a faulty pump seal, or faulty pump gasket.

First, check the oil level and make certain that a sufficient amount of oil covers the intake filter. To check for air leaks, take an oil can filled with hydraulic oil and squirt around each joint in the intake line, around the gasket, and around the pump shaft seal. If the noise stops, you have discovered where the air is entering.

Vibration may cause the intake line to become loosened. If the air is caused by improper baffles, then additional baffles should be added to the reservoir. The return line from the relief valve must be far enough away from the intake filters so that the oil will not be churned up to a point that will allow the air to be held in suspension and then enter the intake filter.

If the return line in the reservoir is above the oil level, the returning oil will cause air bubbles in the oil, which will allow air to go into the intake filter.

7. Pump runs backwards. Concern is often expressed when the electric motor which is driving the pump is stopped and then the pump runs backwards for a number of revolutions before it finally stops. This may be caused by air in the system or by a high head of oil forcing the vanes, or gears of the pump to move in the reverse direction allowing the oil to return to the reservoir until the head pressure is overcome by the friction in the pump and its driving member.

If it is caused by air in the system then the source of air should be found and eliminated. If it is caused by the head pressure then a check valve should be installed as shown in Fig. 2. This will keep the line full of oil whenever the pump is stopped.

It is advisable to use a check valve whenever there are long vertical pressure lines rising from the pump. Make certain that the check valve is placed in the line so that the free flow is going away from the pump.

There are a number of things that can cause a hydraulic pump not to deliver the intended volume or pressure for which it is designed. Many of these are not the fault of the pump, but the fault of some condition in the system.

1. Pump shaft revolving in wrong direction will not deliver fluid or pressure. This is caused by the incorrect rotation of the driving shaft of the electric motor, gasoline engine, or other driving device. When the shaft of a three-phase electric motor is turning in the wrong direction, reverse the motor leads. This will change the direction of shaft rotation. Always make certain, when you start the pump, that the shaft is turning as directed by the rotation arrow on the pump. If not, stop it immediately, as it may cause serious damage to the pump.

2. Pump shaft speed too low: Pumps are designed for certain operating speeds such as 1140, 1200, and 1800 rpm. If full volume is to be expected, operate the pump at the designated speed.

3. Low maximum operating pressure may be caused by conditions within and outside of the pump. A pump whose internal parts have become excessively worn will not deliver the maximum pressure or even the maximum fluid volume due to internal leakage. In such cases, the pump should be repaired or replaced.

A relief valve that becomes stuck in the open position will not allow the pump to produce the maximum pressure or volume. The oil is being dumped through the relief valve back to the reservoir and is not being delivered to the system. A broken spring in the relief valve will also cause this condition. Check exhaust connection of relief valve to find out if all of the oil is being dumped through this port.

4. Low oil level will prevent the pump from delivering its maximum volume. Even though sight level gages are built into the reservoir, often no attention is paid to them. In fact, the glass in them is usually so dirty it is virtually opaque. When maintenance men are cleaning up around a hydraulic system, they should make it a point to wipe off the sight level gage.

5. Oil with too high viscosity. Some pumps will not pick up the prime if the oil viscosity is too high, so therefore will not deliver any oil. Always make certain that the hydraulic oil meets the standards as recommended by the pump manufacturer.

6. Use of incorrect control valve. While the selection of a type of directional control is usually up to the circuit designer, the maintenance man is called upon to find out why the circuit won't function.

Where an open-center directional control valve is installed in a circuit that has other direction controls, it will be up to the maintenance man to find out why the pump does not seem

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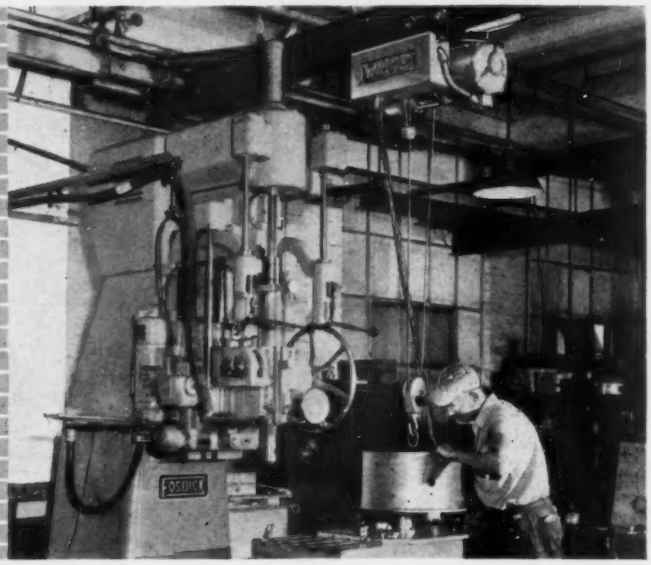

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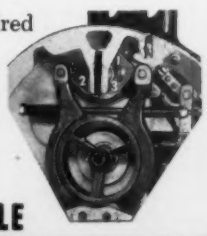

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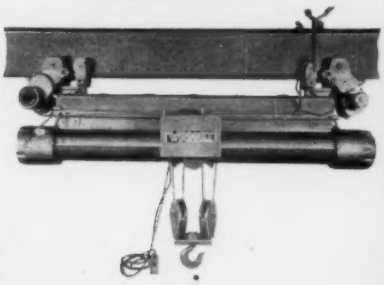

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to be delivering any fluid or pressure. When this occurs the pump will be doing its duty but with an open line all the oil is being returned to the reservoir. Figure 3 shows incorrect circuit while Fig. 4 shows correct circuit. To make any circuit function correctly, pressure and volume must be available when needed. Having a spring-centered open-center valve in a circuit that has other master valves is rather a common error.

It is difficult to place enough emphasis on the necessity of proper pump installation. It is not enough to merely set a pump on the power unit plate and then put in a few bolts. The pump must be mounted solidly on the plate, with a shaft in perfect alignment with the motor shaft, and with the proper amount of clearance between the motor shaft and pump shaft so that flexible coupling will perform efficiently.

The pump half of the flexible coupling must be placed on the pump shaft before the pump is mounted. Check the flexible coupling manufacturer's instruction bulletin for data on proper clearances. Where chain type couplings are used it is recommended that a coupling cover be installed which will keep dirt and foreign matter out of the coupling and will keep lubrication in. Lubrication should be a good bearing grease that has a melting point around 260 F.

Pumps are like any other piece of precision equipment. Give them proper care and use it for service as recommended by the manufacturer and you can expect satisfactory performance. Here are some tips that will help lengthen the life of your pump:

1. Operate it at or less than the pressure for which is it recommended.
2. Operate it at the speed for which it is designed.
3. Keep the oil temperature under 140 F.
4. Pumps requiring bearing lubrication should be lubricated at regular intervals. Follow manufacturers lubrication instructions.
5. Use proper grade of oil in pump. Not all types of pumps operate most efficiently on the same viscosity of oil. Keep all impurities out of the oil.
6. Protect pumps from extreme heat and excessive external foreign matter. Dirt can work its way through the shaft seal into the bearings.
7. Protect pumps from falling objects.
8. Don't lose the instruction tag that is shipped with the pump. This will contain valuable information for your maintenance man. Keep the tag where it is readily accessible.

When dismantling a hydraulic pump for cleaning or repairing, it is imperative that this work be done in a clean place. If the pump parts contain any deposits soak them in a solvent. Deposits which the solvent does not remove should be removed by brushing. Coat the clean parts with hydraulic oil or submerge them in hydraulic oil if the parts are to remain out of the pump for any length of time.

Check all parts for wear and replace worn parts. It is suggested that the seals and gaskets be replaced whenever the pump is dismantled. Be very careful when assembling the seals so the seal edges are not damaged by keyways, etc.

On the more complicated pumping units it may be desirable to return them to the manufacturer for reconditioning since they have tools and equipment for complete overhaul.

Before dismantling a pump be sure to obtain a parts sheet and an instruction booklet from the pump manufacturer. When ordering new parts give the model number and serial number of the pump and properly identify the parts required.

For a critical hydraulic system, i.e., one which is in continuous operation, a spare pump should be stocked in the maintenance department. If several power units of the same size are used in a plant, it is recommended that a complete spare unit be carried in stock. Then if something happens to one of the units, it is necessary to break only two hydraulic connections and one electrical connection in order to set in a new unit and then the defective unit can be taken to the maintenance department and carefully overhauled.

Spare pumps should be stored in a cool dry location, away from the weather. The pump shafts should be coated with a heavy grease. Make certain that the ports in the pump are plugged, either with pipe plugs or shipping plugs in order to keep out dirt and foreign matter.

J.I.C. Symbol Standards Are Still Available

Reproductions of the Standard J.I.C. Symbol Standards for both pneumatic and hydraulic equipment are still available for the asking. Write The Editor, Plant Engineering, 110 S. Dearborn St., Chicago 3, Ill.

Fig. 3. With this open-center directional valve in the circuit oil will return to reservoir rather than to the work

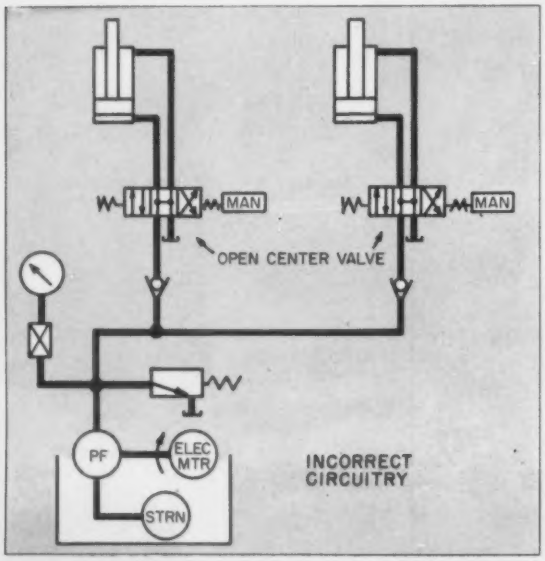
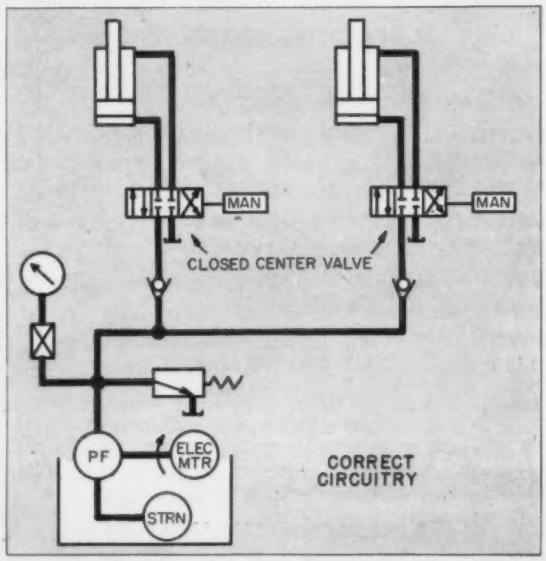


Fig. 4. This is the correct circuitry for the system shown in Fig. 3. Note that system has closed-center directional valve



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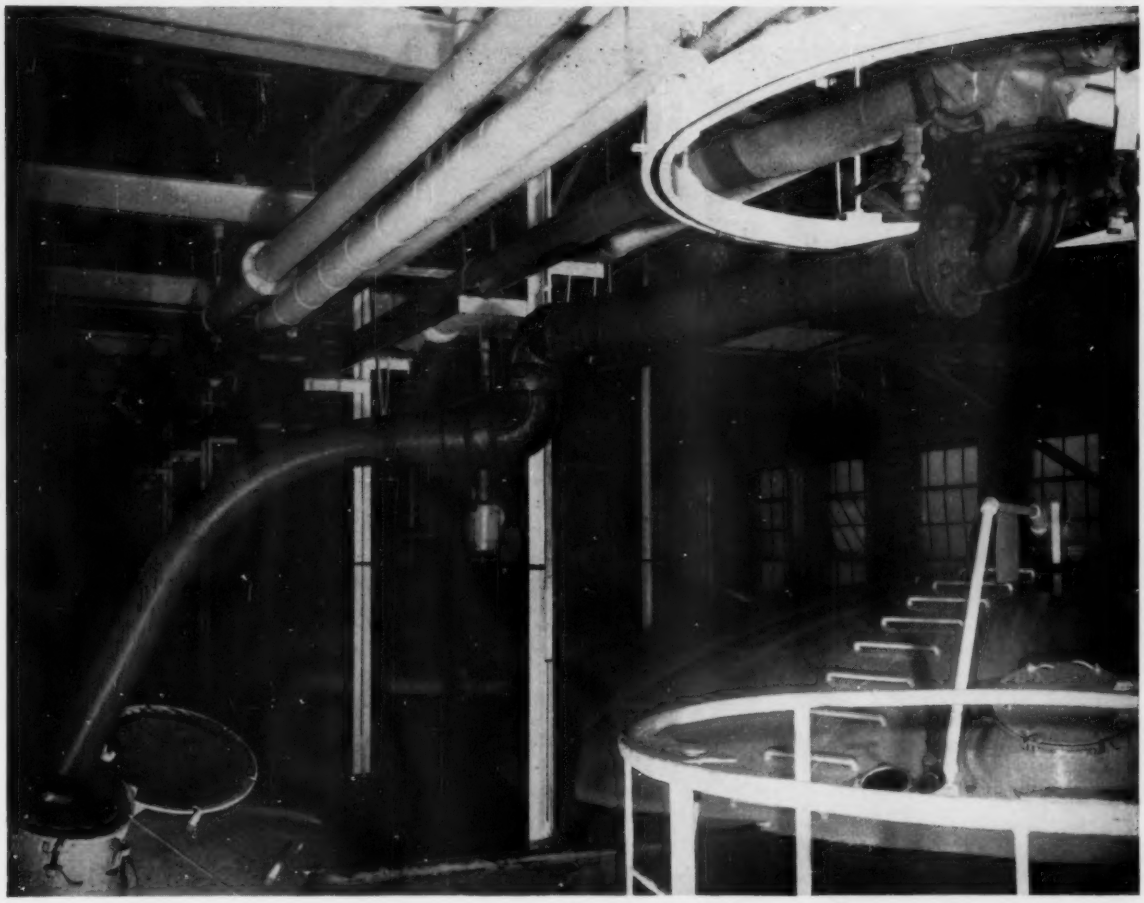

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Instrumentation for Continuous Casting

TO CHECK HIGHLY critical slab or billet temperatures during continuous casting, radiation pyrometers act as "seeing-eyes" for plant operators at Atlas Steels Limited in Welland, Ontario. The continuous casting machine with which the pyrometers are associated was designed and constructed by Koppers Co., Inc. It made news over two years ago as the first commercial installation for steel casting on this continent.

Successful production for various grades of steel requires precise control and near perfect synchronization of such operating variables as: (1) molten and solid metal temperatures, (2) molten metal levels, (3) machine speed, as well as (4) cooling water temperatures and flow rates.

The accompanying diagram summarizes the instrumentation originally furnished by Leeds and Northrup and also the Brown Instrument Co. controls added later for ladle tilting and level measurement of molten steel in the mold.

A variable condition at the start of the casting process, temperature in the ladle varies according to the grade between 2750 and 2850 F and is maintained near the desired value by a high-velocity burner. When the ladle arrives at the machine, the operator checks this temperature with an immersion thermocouple (TR-1) unit, connected to a panel-mounted recorder.

The operator uses this same immersion couple to check temperature in the tundish into which the ladle pours the molten metal. He also uses it occasionally to check the metal temperature in the mold.

Although not used at present in normal operation, a Baldwin SR-4 load cell mounted under the tundish measures weight of molten metal in the mold. Based upon this weight measurement, an automatic controller (WRC) can adjust the ladle tilt through an electric motor. At present, operators manually control the ladle tilt based on visual observation of the molten metal level in the tundish.

The operator manually regulates machine speed according to level in the mold, maintaining the level some 2 to 4 in. below the top edge. Atlas Steels added a gamma ray type level measuring instrument connected to a recorder-controller (LRC) which has been used successfully on an experimental basis to automatically regulate the machine speed.

Thermocouples connected to a multipoint, panel-mounted recorder measure both inlet and outlet cooling water temperatures. A flow meter measures the water flow rate, and records its value on the same recorder (TR-2).

Below the mold, water sprays perform the important function of cooling the casting as it moves downward toward the pinch rolls. Complete and uniform cooling is essential. Here, too, thermocouples measure both inlet and outlet spray water temperatures and record these values on the same multipoint instrument that records mold coolant temperatures and flow rate.

Below the spray cooling chamber, four Rayotube detecting elements sight on the four sides of the moving slab, measuring temperatures which have dropped now to about 1600 F. The casting at this point should be solidified entirely. Above this, the molten metal inside the casting shell should be in the shape of an inverted cone with its point of apex at center of slab.

A tachometer-generator is geared to the rotating pinch rolls. The actual machine speed for each production run is recorded in inches per minute, providing a valuable permanent record of daily production.

Fig. 1. Two of four units for measuring surface temperatures

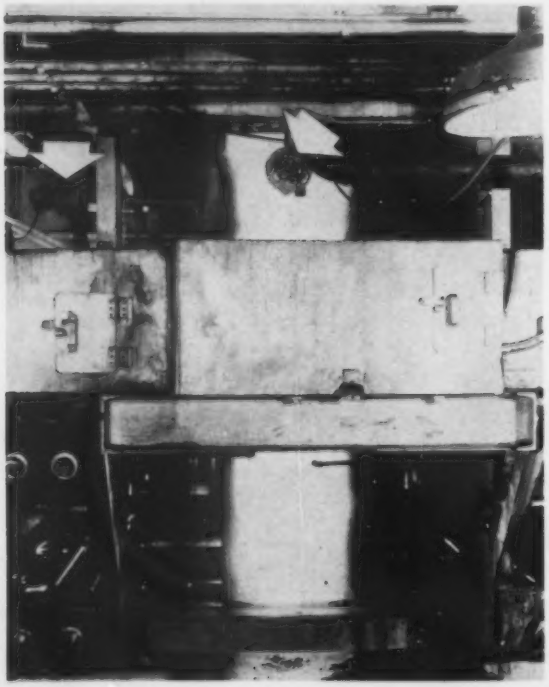
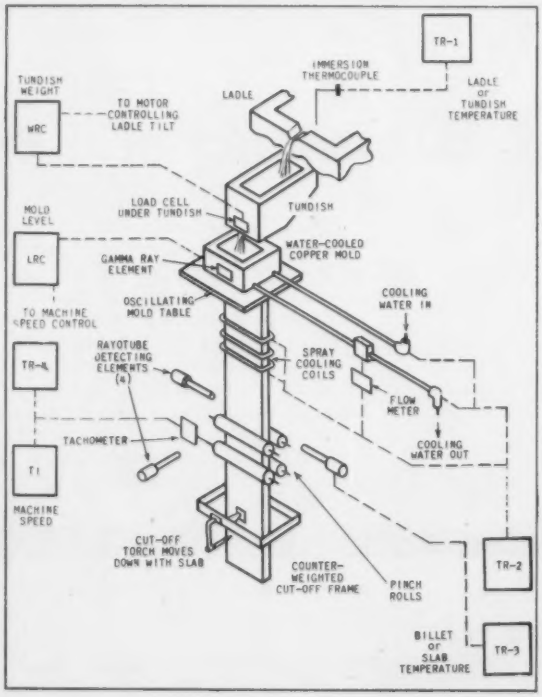
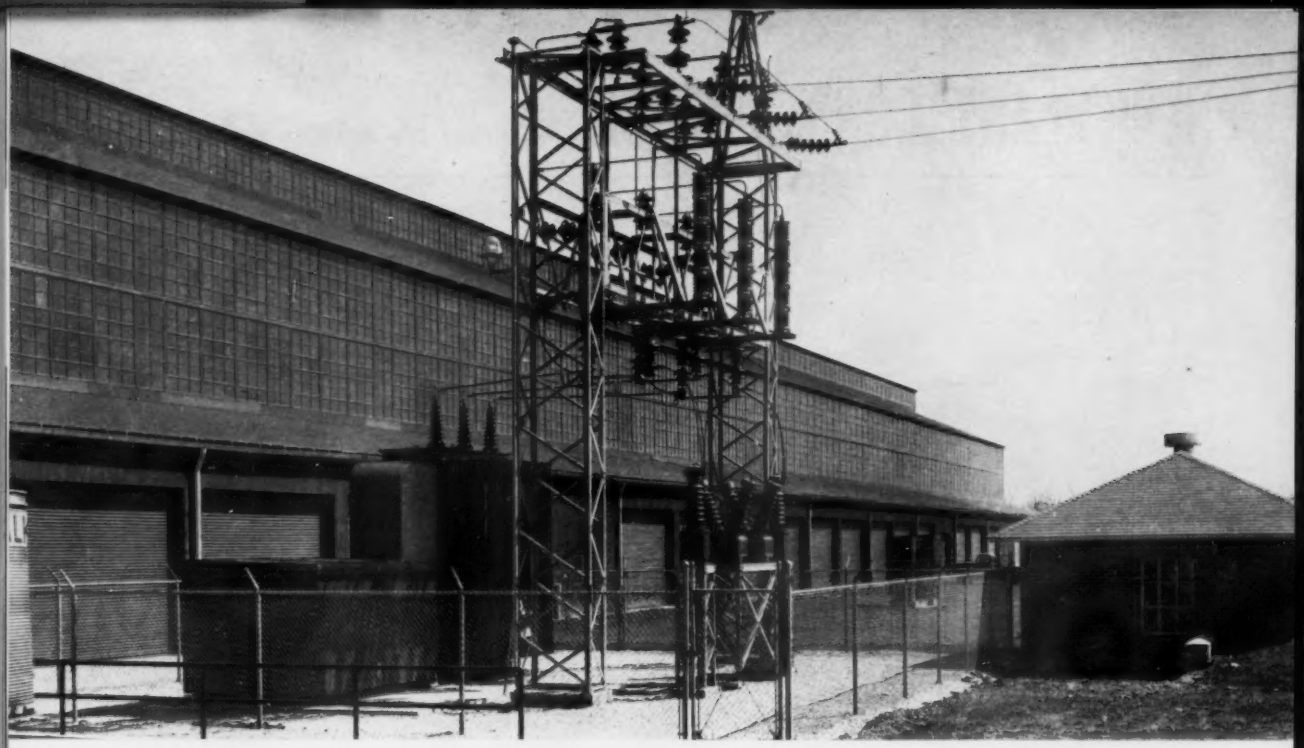


Fig. 2. Schematic diagram, casting machine instrumentation





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Finally, G-E substations are good-looking. Their clean, modern lines will blend in attractively with any contemporary plant. For more information about G-E unit substations for your plant, contact your G-E Apparatus Sales Representative, or write to Section 512-7, General Electric Company, Schenectady 5, New York.

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FAST INSTALLATION of G-E unit substation is possible because unit is factory preassembled.

NEW PLANT CONSTRUCTION — advance information on location, costs

Phoenix, Ariz.—Sperry Rand Corp., 30 Rockefeller Plaza, New York, N. Y., plans to construct a new multi-million dollar plant for the production and development of electronic engine control and flight control systems for drone and manned aircraft. The first unit with a floor area of 100,000 sq ft will be constructed on a 480-acre site at a reported cost in excess of $2 million.

Fayetteville, Ark. — Standard Register Co., 628 Albany St., Dayton, O., has plans under way for the construction of new plant here, for the production of marginally punched forms and autographic register and feeding devices for business machines. Plant will have a floor area of 64,000 sq ft with provision for an additional 120,000 sq ft for future needs and will cost about $3 million.

Construction is underway on this new office building for Monsanto Chemical Co. in St. Louis, Mo. The office cluster concept was developed by the Office Planning Division of Shaw-Walker Co. They also designed the new offices of the Atlas Powder Co. at Wilmington, Del., and RCA's new offices at Cherry Hill, N. J.*

Forrest City, Ark. — Yale & Towne Manufacturing Co., 405 Lexington Ave., New York 17, N. Y., plans to construct a new plant here for the production of materials handling equipment. Facility will have a floor area of 120,000 sq ft, and will cost approximately $2 million.

Los Angeles, Calif.—National Cylinder Gas Co., 840 N. Michigan Ave., Chicago 11, Ill., has announced work will begin at once on building program to provide an additional 70 per cent boost in production capacity of its electrolytic hydrogen plant here.

Puente, Calif.—Payne Division of the Carrier Corp., Carrier Bldg., Syracuse 1, N. Y., plans to construct a new plant and office building for the manufacture of air-furnaces, all year air conditioners, wall heaters, floor furnaces and duct furnaces. Plant will cost $6 million and will have a floor area of more than 500,000 sq ft.

San Leandro, Calif. — Yale & Towne Manufacturing Co., 405 Lexington Ave., New York 17, N. Y., has announced plans for the construction of a new plant for the manufacture of lift trucks. New plant will have more than 100,000 sq ft of floor area and will cost approximately $1 million.

Stamford, Conn.—American Machine & Foundry Co., 261 Madison Ave., New York, N. Y., plans to build six one-story buildings with approximately 200,000 sq ft of floor space to house the headquarters and laboratories of its Central Engineering Laboratories. Cost of buildings and equipment to exceed $4 million.

Pensacola, Fla.—St. Regis Paper Co., 75 E. 45th St., New York 17, N. Y., reports work is already under way on the construction of a pulp processing facility near here, for the production of 300,000 tons of pulp per week. Cost of this facility, scheduled for operation in 1958, will be about $1.5 million.

Tampa, Fla.—Joseph Schlitz Brewing Co., 235 W. Galena St., Milwaukee, Wis., has authorized plans for the construction of a new branch brewery on a 55-acre site recently purchased by the company. The plant with a production capacity of about 1 million bbl a year is expected to be in operation by late 1958. The new plant will cost in excess of $20 million.

Mapleton, Ill.—Olin Mathieson Chemical Corp., Mathieson Bldg., Baltimore 3, Md., plans to construct a new plant for the manufacture of automotive antifreeze. New plant will be a one-story steel and concrete structure with approximately 90,000 sq ft of floor space.

Clinton, Iowa—E. I. du Pont de Nemours & Co., Film Department, Nemours Building, Wilmington 98, Del., has announced a multi-million dollar expansion of company facilities for the production of cellophane at local plant here. Capacity of plant will be increased by 10 million pounds annually, with an additional 20 million pounds to be added in the near future.

Neodesha, Kan. — Standard Oil Co., (Indiana), 910 S. Michigan Ave., Chicago, Ill., has authorized plans for the construction of new ultraforming unit here for the processing of more than 6000 bbl of naptha daily. Contract for construction of the new facility has been awarded to the Foster Wheeler Corp., 165 Broadway, New York, N. Y.

Calvert City, Ky. — B. F. Goodrich Chemical Co., 2069 E. 9th St., Cleveland 15, O., reports work is already under way on new plant for the manufacture of specialty acrylic polymers used as textile sizes, binders, and flocculating agents and additives for the pharmaceutical, cosmetic and latex paint formulations. New units are scheduled for production in 1957 and will represent an investment of approximately $2.5 million. Wigton-Abbott Corp., Plainfield, N. J., is the general contractor.

Henderson, Ky. — Spencer Chemical Co., Dwight Building, Kansas City, Mo., has announced plans for the erection of a new plant for the production of nylon plastic molding compounds. Construction work will get under way at once for completion in late summer of 1957. Cost of plant will be $2 million.

Whitinsville, Mass. — Whitin Machine Works, textile machinery and accessories has announced plans for the construction of a new manufacturing building to cost in excess of $1 million. Another $1 million will be spent for machine tools, $500,000 for expansion of facilities at Charlotte, N. C., and the remainder on expansion of existing facilities. Total expansion will approximate an investment of $4.5 million.

Kalamazoo, Mich.—Fuller Manufacturing Co., Prouty St., has announced plans to increase size of company's heavy duty transmission plant, with addition of 112,000 sq ft of floor space to existing facilities. Addition will cost approximately $2 million.

St. Paul, Minn. — National Cylinder Gas Co., 840 N. Michigan Ave., Chicago 11, Ill., has announced plans for the construction of a new hydrogen producing plant in the Twin Cities area. New plant will be built on company site where oxygen, nitrogen and acetylene producing facilities are already established.

Anaconda, Mont.—Anaconda Copper Mining Co., 25 Broadway, New York,

(Continued on page 188)

* A complete report on how RCA's plant engineering department pre-planned the Cherry Hill project appeared in the December, 1954 issue of PLANT ENGINEERING. We still have a number of reprints of this report and readers interested in having a copy should indicate "Cherry Hill Reprint" on the postcard in this issue.

There's more in this barrel for you...

S. F. Ketcham, Socony Mobil Field Consultant, analyzes oil circulation system design at drafting board stage.

MORE MACHINE BUILDERS' APPROVALS
to help improve production and lower unit costs

Specify Socony Mobil—and you get petroleum products approved by more machine builders than those of any other oil company. And no wonder. Our engineers have always worked closely with designers and builders. They advise on hydraulic and lubrication system design . . . suggest *correct* products for each machine—to help improve your production, lower unit costs.

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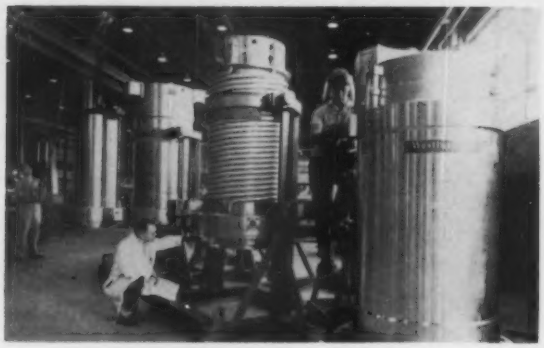
For more facts circle 572 on Reply Card

Pumps for Atomic Generating Station Keep to Themselves—In "Cans"



FOUR "canned" motor pumps—the world's largest—have entered final construction stages at Westinghouse Electric Corporation's atomic equipment plant at Cheswick, Pa. Rated at 1600 hp, these 2300-volt pumps are the main coolant pumps for the atomic electric generating station to be built at Shippingport, Pa.

In this type of pump, both the stationary outer coils and the rotor are canned in metal, and the radioactive water flows through the space between them. The water also acts as a bearing lubricant.

Each pump stands 10 ft high, is 4 ft in diameter and weighs nearly 14 tons. Capacity of each pump is 18,300 gpm at approximately 2000 psi at up to 600 F. There are no external shaft seals in the motor pumps, and the suction and discharge nozzles can be welded into the pipeline.

Massive Institution Gets a New "Hat"—Colored to Match the Old

AS PART of the complete rehabilitation of the 60-year-old Carnegie Institute and Library in Pittsburgh, Pa., an all-aluminum sea-green colored, batten-type roof system is replacing the original Spanish tile and copper roof. The roof covers more than 196,000 sq ft, including some 40,000 sq ft of skylight area.

Overly Manufacturing Co., fabricating and installing the roof, is completing the re-roofing project without interrupting activities inside the building, by applying the roof in sections, sealing each section as it is finished.

The roof features a mechanical, interlocking joint system that is permanently watertight, but allows for expansion and contraction. To apply the new system, the old roof was stripped down to the decking, with new steel purlins installed in some areas and a metal deck welded to the purlins.

Spaced 32½ in. on centers, wood sleepers, 1¼ in. by 1¾ in., are attached to the top of the deck. Glass fiber insulation is slipped into the space between these sleepers and the entire area covered with 30-lb roofing felt.

To install the aluminum, a lower extruded batten bar is fastened through the felt into the wood sleepers, and held in place by a metal bar clip. After roofing sheets are hooked over the edges of the lower batten bar, a cap is applied.

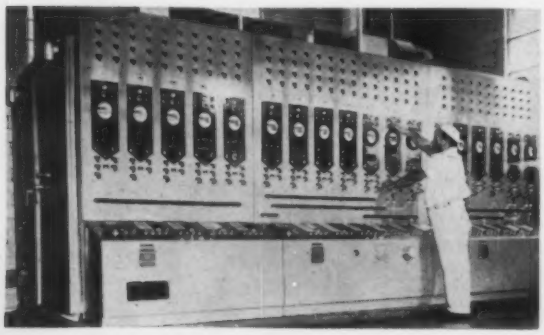
The aluminum is being given a green-toned Alodine finish, to match the green patina of the copper and bronze sculpture and ornaments that remain on the building.

Flat aluminum roofing sheet was supplied by Aluminum Company of America, 0.040 in. in thickness; aluminum sheet used for new gutters and cornices was 0.125 in. thick, with a heliarc welding process used to join them.

The aluminum section of the new roof will weigh slightly less than one pound per square foot, with a total completed weight of about 630,000 lb—compared to 2 million pounds for the old roof.

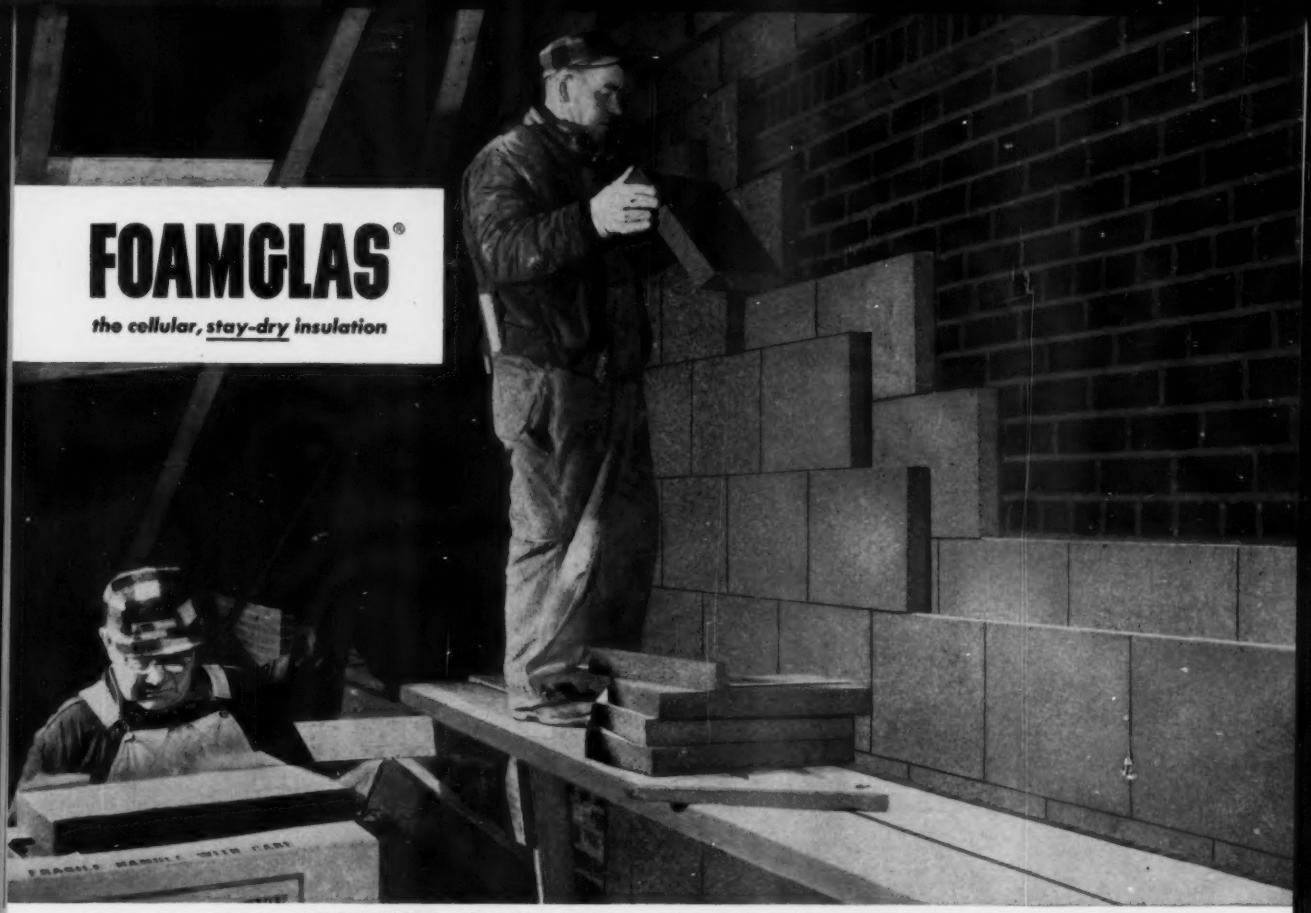
Central Panel Controls Weighing, Proportioning and Discharge of Ingredients

AN AUTOMATIC system that controls feeding, weighing, proportioning and discharge to mixers of seven ingredients used in the manufacture of various products is in use at the National Biscuit Co. plant in Philadelphia, Pa. Items handled by the system, which was designed and built by Richardson Scale Co., Clifton, N. J., include sweet flour, graham flour, sugar, shortening, molasses, water and invert.



The centrally located control panel, designed for one-man operation, has easily accessible controls mounted on its face for 18 different scales, along with remote indicators for each scale. All scales, except one for graham flour, have three sets of weight selectors, so that three different formulas can be run through the system automatically. Weight selectors are mounted on the inside of the panel to prevent formula change except when authorized.

Electrical interlocking controls include arrangements to: cut off the weighing operation if any scale exceeds established tolerances; flash a signal light on the control panel if any feeder or conveyor jams or is overloaded; and maintain a complete push-button communication system between the operator of the panel and operators of each of the 16 mixers in the system.



This multilayer application of 2" FOAMGLAS is at Food Fair's Linden, N. J., abattoir. In this and similar installations throughout their chain, Food Fair relies on moisture-proof FOAMGLAS to help protect food quality . . . by insuring constant, long-lasting insulating value for efficient refrigeration at low cost. Insulation Contractor: Waverly Builders, Inc., Hillside, New Jersey.

In stores and warehouses throughout their growing chain . . .

Food Fair depends on moisture-proof FOAMGLAS to keep insulating value up—refrigerating costs down

In ten short years, Food Fair Stores, Inc., Philadelphia, has grown from 89 stores and sales of $101 million to 237 stores and annual sales of nearly $475 million. Constant, careful attention to food quality has played a big role in that phenomenal growth. And Food Fair's use of *moisture-proof* FOAMGLAS for dependable insulation in refrigerated areas in their stores and warehouses reflects that attention to quality.

Food Fair has found that FOAMGLAS stands for constant insulating efficiency without the costly headache of insulation replacement. Its sealed cellular structure and all-glass composition make it an effective vapor barrier—sealing out the moisture that destroys efficiency of ordinary insulations. And the unique combination of FOAMGLAS strength and rigidity makes it an ideal structural material in many applications . . . even under floors where it can easily withstand loads of over seven tons per square foot.

In various applications throughout their chain, FOAMGLAS insulation for roofs, ceilings, corewalls, wall linings and floors gives Food Fair long-life insulating protection. That insures dependable, low cost refrigeration in such varied locations as an abattoir in Linden, N.J., a warehouse in Baltimore and supermarket cold rooms throughout the Baltimore-Philadelphia area. The excellent performance of FOAMGLAS in all these uses has led Food Fair to plan similar installations for their continuing expansion program.

Prove to yourself that *you*, too, can solve your insulating problems best with FOAMGLAS. Send today for a free sample and directions for six simple "desk top tests" that quickly demonstrate the valuable combination of qualities you get only with FOAMGLAS. Address . . .

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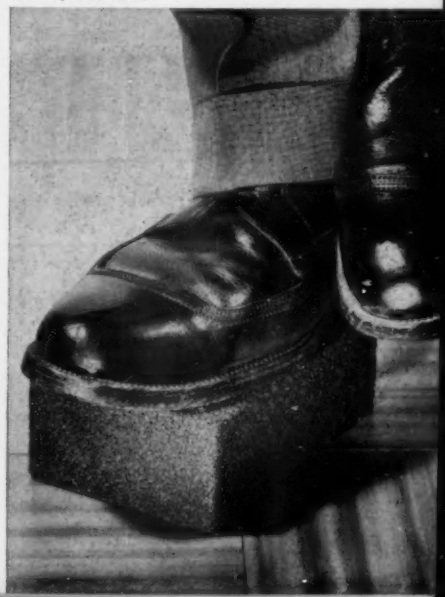
With this test you can quickly prove to yourself the unique compressive strength of FOAMGLAS . . . which allowed Food Fair to use it even beneath load bearing floors. Send today for a FOAMGLAS sample and directions for six simple tests which demonstrate clearly its unique benefits.

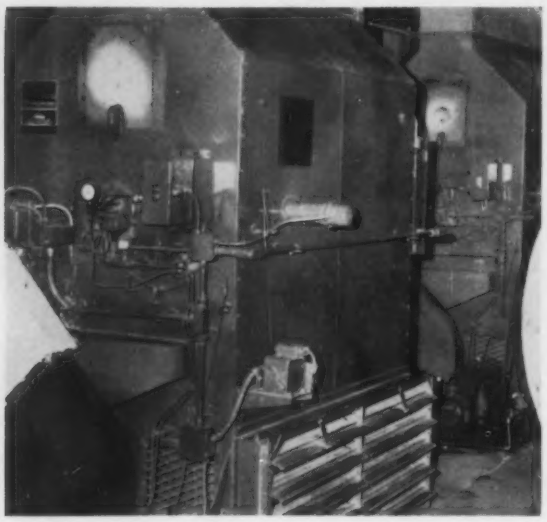


For more facts circle 573 on Reply Card

New Drying System Joins Forces With Materials Handling To Increase Production

PRODUCTION OF flower pots by a Pennsylvania manufacturer has been substantially increased by the installation of a new drying system.

New equipment includes a two-deck oven dryer 35 ft by 146 ft by 13 ft high, two Dravo oil-fired, warm-air space heaters, each with a heat output of 1,000,000 Btu, air duct and diffusers. Design of the dryer is based on a heat load of 1,420,750 Btu per hour with an inside temperature of 140 F and 70 per cent relative humidity.



Air is drawn into the base of each heater through louvered openings. It passes over staggered banks of economizer tubes, which carry flue gas to the vent stack and then sweeps around the combustion chamber. From here it is discharged through a duct into a lower deck of the dryer.

To maintain maximum operating efficiency, the dryer is equipped with controls for temperature regulation. A thermostat regulates internal temperature through direct control of the oil burners, modulating the flames according to heat requirements.

Air flow into the dryers is kept constant at all times and adequate distribution within two decks is maintained by fans strategically located in the areas. Initial air movement is supplied by the 11,000 cfm self-contained fan in each heater and a separate booster blower takes air from the lower deck to supply the upper one.

This system of supplying and distributing the drying air permits efficient use of the modern materials handling system which consists of two overhead mono-rail conveyors fitted with four-tier carriers. Pots are transported on the carriers through the dryer on their way from the pressing room to firing kiln. The conveyor makes 16 reverse passes traveling at 6 fpm through the length of the dryer. In making these passes, the carriers turn through a 360 degree arc to expose the full circumference of each pot to the drying air currents.

Crane Scales Weigh, Take Inventory of Aluminum Tubes in One Operation

SCALES BUILT right into its materials handling crane save more than 40 per cent of the time used in weighing materials for inventory control at the Ellenville, N. Y., plant of Channel Master Corporation.

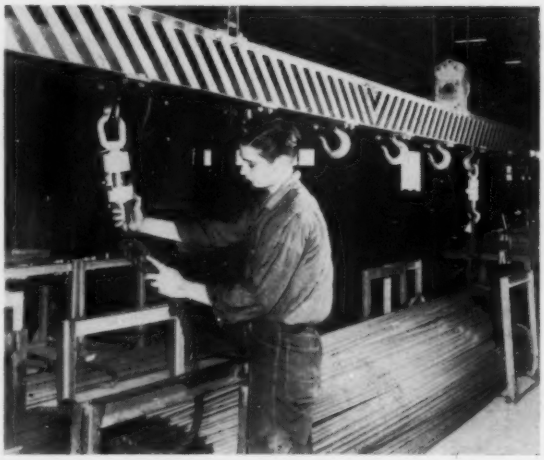
In fabricating aluminum tubes for TV antennas and lawn furniture, Channel Master uses a three-ton Conco traveling crane to move tubing bundles from one processing bay to the next.

By installing crane scales between the crane boom and the load and equipping the cab with a meter which indicates the weight of the materials, Channel Master takes inventory control records at the same time that the materials are moved.

Formerly, the crane picked up a bundle of tubes at one processing point, ran it to platform scales, lowered it to position where the tubes were balanced and weighed, then picked up the bundle and delivered it to the next processing point. It was estimated that each of the two or three times the tubes were weighed during processing, about three minutes of production time were lost.

Under the new system, weighing takes half a minute. The crane operator lifts the bundle of tubing at one department, pauses when it is clear and reports the readings on the scale dial in his cab to the rigger who records the weight on the job ticket and punches it on a tag attached to the bundle. The tubing is then moved directly to the next processing department.

Two crane scales having a capacity of 2500 lb, made by Baldwin-Lima-Hamilton Corporation, Waltham, Mass., are used to weigh the tubing bundles on the fly. The scales are attached to hooks on the crane boom by their top rings and the lines with which the bundle is lifted are attached to the hooks at the bottom of the units.



The scales communicate the weight, through electric cables, to the scale dial in the cab of the crane operator, where the weights registered on the two load-cells are automatically added, the tare weight of lifting cables and hooks deducted, and the net weight reported on the dial.

The 20-ft boom, which hangs from the crane hook, is equipped with ten hooks which permit riggers to handle various bundle lengths—from 4 to 28 ft.

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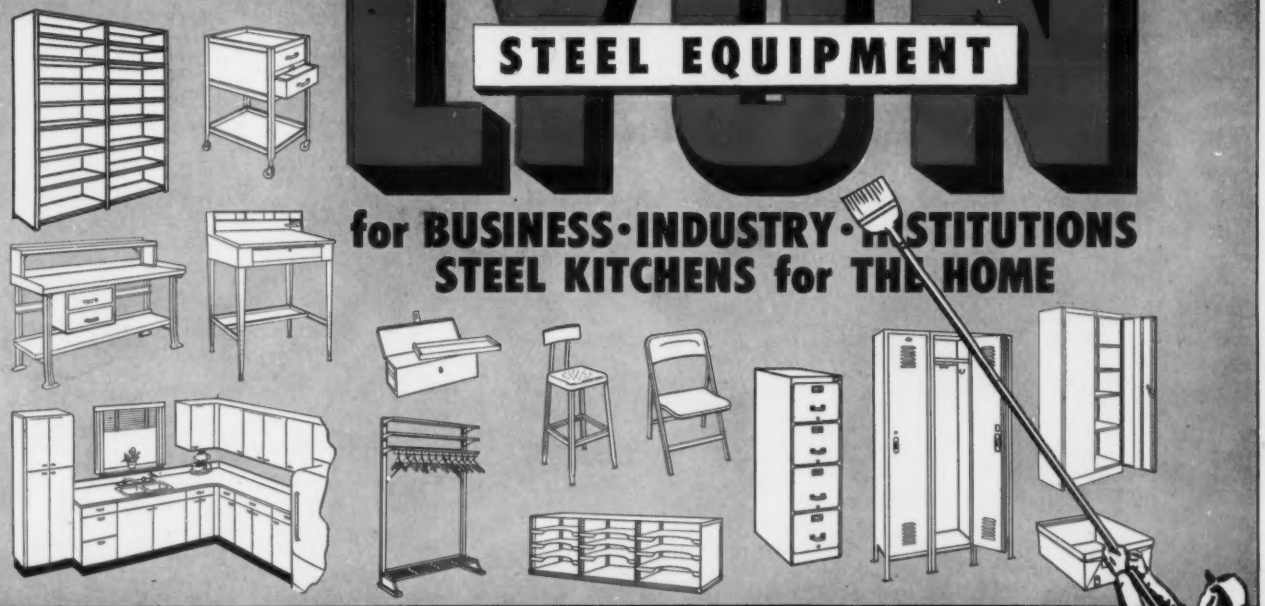
Lyon also has complete facilities for manufacturing special items to your specifications



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MICRO precision switches

...THEIR USE IS A PRINCIPLE OF GOOD DESIGN

HONEYWELL

these switches are EVERY DAY KEYS to automatic operation of your plant machinery

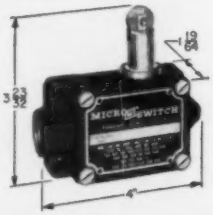
These MICRO SWITCH precision switches are low-cost tools of automation in industrial plants everywhere.

By their use plant superintendents, electricians and maintenance men have tremendously increased the work capacity of existing machinery and the personnel who operate it.

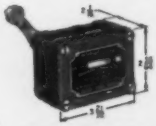
The MICRO SWITCH way is the modern way to improve production capacity on a modest budget. These switches are readily available everywhere. They are stocked by authorized distributors in key cities. Look under "Switches, Electric" in the Yellow Pages. Technical assistance on switch problems is available from MICRO SWITCH Engineering Service at any branch office.

Send for Catalog 101 on "Switches for Industry"

Here is the Type "LS," a small, high capacity two-circuit limit switch. The durable aluminum enclosure protects the switch from physical damage. Seals prevent foreign matter from entering the switching chamber.



High capacity Type "F" enclosed switches are for applications which require a small enclosed switch to handle a large electrical load.



Splash-proof Type "OP" switch assemblies are for locations where splash of liquids would hinder performance of less adequately protected switches.

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ACTUAL SIZE

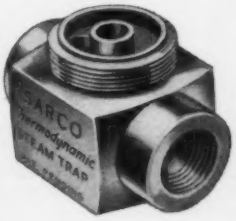
SO RUGGED **SO SIMPLE**

this steam trap practically eliminates maintenance

1. A CAP

2. A DISC

3. A BODY



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That's the revolutionary new Sarco type TD. It has only one moving part...a hardened SOLID stainless steel disc. And it is not affected by superheat, water-hammer, corrosive condensate. That's why we can say INSTALL IT—FORGET IT!

Use the SAME trap for 10-600 psi...for light or heavy loads ...without seat or valve change or other adjustments. Closes tight on no load—no steam waste.

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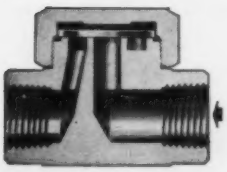
Only Sarco Makes All 5 Types

That's why Sarco can give impartial advice on proper steam trap selection.



SIMPLICITY ITSELF!
No valve-closing mechanisms to wear or stick. No critical clearances to choke. No gaskets to leak. Only moving part a SOLID stainless steel disc.

Thermodynamic Steam Traps

Thermostatic Steam Traps

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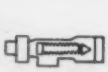
Liquid Expansion Steam Traps

Camlift Bucket Steam Traps

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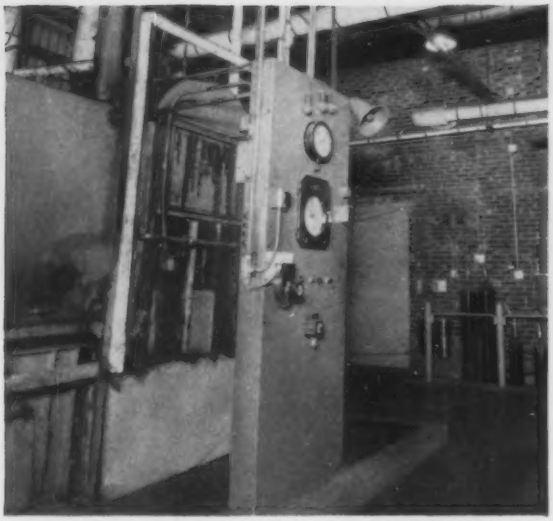
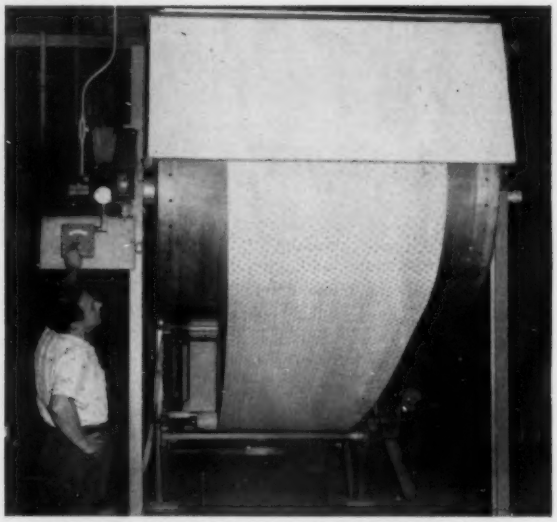
Four ways to make a better product with Fenwal units



MEASURING LIQUID LEVEL IN A HOT ASPHALT TANK. High temperature and extreme viscosity of asphalt were no problem for THERMOSWITCH units in this unique application devised by engineers at the Flintkote Company. The Fenwal THERMOSWITCH units were not affected by these severe conditions, which interfere with the operation of most liquid level instruments. *Write for latest literature.*



CONTROLLING A RADIANT HEAT DRYING DRUM. A Fenwal Series 541 Indicating Temperature Controller is connected by a capillary tube to the temperature-sensing bulb, located close to the exterior surface of the drum. The Series 541 keeps the temperature of the drum surface within ± one-quarter per cent of the controller scale — outstanding performance for processing equipment of this type. *Write for latest literature.*

PREVENTING COLD STORAGE DOORS FROM FREEZING. Jamison Cold Storage Door Company's heating unit "Frostop" uses a Fenwal 17000 THERMOSWITCH unit to control the heater and prevent excessive icing. The THERMOSWITCH unit's external, single-metal shell expands or contracts *instantly* with temperature changes, making or breaking enclosed electrical contacts. Compact, highly resistant to shock and vibration, this unit has solved hundreds of costly problems. *Write for latest literature.*

CONTROLLING GENERAL ELECTRIC-TELECHRON TESTING TEMPERATURE CHAMBER. Fenwal's highly flexible Series 560 Indicating Controller controls a specially constructed chamber used for testing. The temperature range of the chamber is 45° to 105°F. In a recent test of Telechron's electronic clock the Series 560 was set on proportional control and controlled the temperature within a degree of the visual setting! *Write for latest literature.* **Fenwal Incorporated, 3912 Pleasant St., Ashland, Mass.**

Fenwal Controls Temperature... *Precisely*

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Parlon® Stays On

Para-Val Resists Sulfuric Acid Fumes

A REAL CHALLENGE—In this acid cleaning room at a Southern steel mill wire rods are cleaned by being dipped in sulfuric acid. To resist fumes, walls and structural steel are painted with Parlon-based Para-Val, product of Valdura Division, American Marietta Co., Chicago.

Wherever the challenge is the greatest you'll find Parlon-based protective coatings lasting the longest at lower long-term cost. That's because Parlon coatings have what it takes to resist the corrosive attack of acid, alkali and the elements.

Parlon-based chlorinated rubber paints have a proven record of service in plants from coast to coast where other coatings had failed. As a result more and more maintenance men are specifying Parlon finishes for those hard-to-protect surfaces.

Easy to apply, quick drying—Parlon has everything that you seek in a protective coating. For full technical data on Parlon-based paints, call or write your regular supplier of quality paint finishes or write directly to Hercules.

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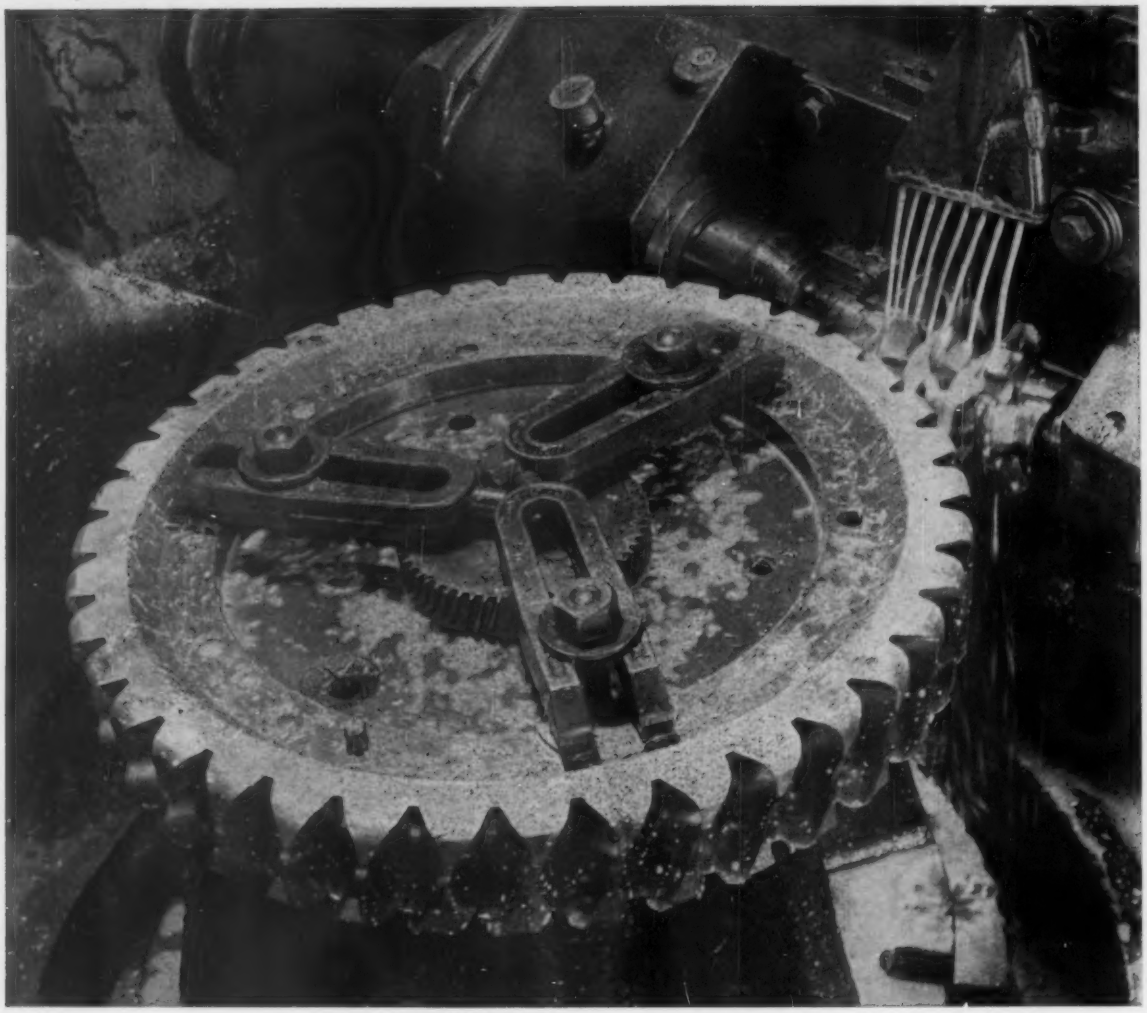
PARLON CHLORINATED RUBBER PAINTS ARE AVAILABLE FROM 400 MANUFACTURERS UNDER THEIR OWN BRAND NAMES

For more facts circle 579 on Reply Card



You can't do a quality job ...unless your coolant is clean

Abrasive dust in a machine tool's coolant seriously interferes with quality work and puts added wear on the coolant pump. Dirty coolants are particularly harmful in precision work. The only sure protection is effective filtration. It's also far more economical than repeatedly cleaning your equipment, and replacing the coolant. The finest filter available for this job is the Purolator Micronic® filter. Purolator's Micronic filters assure full protection for all kinds of work – and pumps – as no other filter does.

Purolator's Micronic element is made of plastic-impregnated cellulose. Its controlled porosity evenly filters out fine submicronic dust particles. It can't possibly channel, and it's in no way affected by high temperature, oil, or water.

Find out how Purolator Micronic filters can help you improve precision and cut down wear and tear on equipment by keeping coolants clean. Write for new Industrial Catalog to Purolator Products Inc., 970 Brunswick Ave., Rahway, N. J. Dept. P3-124.

Filtration For Every Known Fluid

PUROLATOR

PRODUCTS, INC.

Rahway, New Jersey and Toronto, Ontario, Canada

For more facts circle 580 on Reply Card

Modernization

with new glass block sash replacement,
Barton Candy Company, Brooklyn, New York.

BEFORE

AFTER

In this extensive remodeling at Barton Inc., more than 10,000 eight-inch and 4,400 twelve-inch glass block were used in sash replacement. Architect: Tobias Goldstone. Contractor: Apco Construction Company. Both of Brooklyn, New York.

"Modernization with Owens-Illinois Glass Block brought us a host of working advantages." Nathaniel R. Kaplan
Vice President, Barton Inc.

"Owens-Illinois Glass Block have assured our privacy and given our plant durable beauty.

"In the Confectionery Industry," continues Mr. Kaplan, "insulation against heat, absolute cleanliness, and well-diffused lighting are prime essential building requirements . . .

". . . Owens-Illinois Glass Block have lived up to these specifications."

In any plant or office, the first thing you notice with glass block panels is softer, better light. From early morning until late afternoon, daylight spreads evenly over the entire room . . . even to areas far removed from the panels.

Then, a second advantage becomes apparent. Heating and air conditioning systems work far more efficiently! Thanks to the greater insulating properties of glass block, closer control of room temperatures is easier to maintain. And, since Owens-Illinois Glass Block are extremely difficult to break, there's virtually no maintenance . . . and no replacement of window frames and sashes.

If you are in the process of remodeling an old structure or building a new one, don't overlook the positive advantages that panels of Owens-Illinois Glass Block bring. For additional information write Kimble Glass Company, subsidiary of Owens-Illinois, Dept. PE12, Toledo 1, Ohio.

OWENS-ILLINOIS GLASS BLOCK
AN (I) PRODUCT

For more facts circle 581 on Reply Card

OWENS-ILLINOIS
GENERAL OFFICES · TOLEDO 1, OHIO

Gardner-Denver... Serving the World's Basic Industries

Model 125 two-wheel, trailer-mounted, portable compressor, available in gas or diesel. Model B37 paving breaker.

Save Time, Money and Man-Hours Choose Gardner-Denver for Plant Maintenance

For low-cost air where and when you need it, choose this Gardner-Denver 125 for your portable air supply. Team-up the 125 with Gardner-Denver quality maintenance tools. They're built to last. Designed for the job. They help your crew get the work done faster.

Running Conduits

Digging Trench

Tamping Backfill

GARDNER - DENVER

THE QUALITY LEADER IN COMPRESSORS, PUMPS, ROCK DRILLS AND AIR TOOLS FOR CONSTRUCTION, MINING, PETROLEUM AND GENERAL INDUSTRY

Gardner-Denver Company, Quincy, Illinois

In Canada: Gardner-Denver Company (Canada), Ltd., 14 Curity Avenue, Toronto 16, Ontario

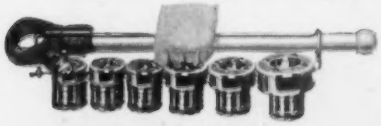
For more facts circle 582 on Reply Card

RIDGID

⅛" to 2" Drop-Head Threaders

Handiest darned ratchet threaders you ever used!

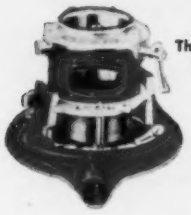
Really handy, time savers, easy to use. Pick up the size head you need, snap it into the ratchet ring . . . and start threading! Heads can't fall out. Dies reverse easily for close-to-wall threading. Conduit and special dies available. Free carrier with sets. For perfect threads easily and long service, buy 'em at your Supply House.



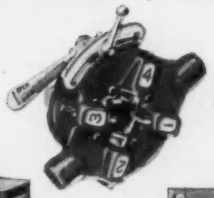
Carrier Free with Sets

Bolt Threaders, too— ask for RIDGID OOR-B, same easy-work advantages as drop-head pipe dies.

Whole Line of RIDGID Pipe Threaders Offers You Extra-Easy Threading



RIDGID Jam-proof 65R Threads 1" to 2" pipe with 1 set of dies.



RIDGID 504 Threader for power drive use— threads 1" to 2" with 1 set of dies.

RIDGID 4P Geared Threader 2½" to 4" pipe— extra-easy handling, no upkeep.

RIDGIL Top Quality Sulphur-Lard Thread-Cutting Oil

RIDGID Work-Saver Pipe Tools

The Ridge Tool Company • Elyria, Ohio, U. S. A.

For more facts circle 583 on Reply Card

NEW PRODUCTS AND PROCESSES summarized for your convenience

Edited by M. E. Heniken

1—1000-W LAMPS offer better color, performance

Two new 1000-w semi-reflector fluorescent mercury lamps are announced as providing improved color rendition and greater light efficiency. According to manufacturer, the high output, high efficiency lamps make golden-white mercury light practical in high bay industrial lighting applications where fixtures are too small to make efficient use of the fully coated lamp. These new lamps (the D-H12-WD, 220 v, and the D-H15-WD, 465 v) are coated only on the half of the lamp nearest the base. This half-color-correcting coating serves a double purpose: it acts as a downward reflector and it serves as a color-correcting fluorescent coating.

Color of the light produced is declared good. Also, the amount of light usually trapped in the upper neck of the fixture is said to be substantially reduced. And because the reflective fluorescent coating is on the inside of the lamp, light maintenance is better in areas where dirt is present in the atmosphere. These lamps will increase efficiency of lighting systems in many installations where company's standard fully coated mercury lamps (C-H12 and B-H15) are being used, and are interchangeable with them. Lamp Div., Westinghouse Electric Corp.

2—BUMPER cushions ships bumping against the dock

Cylindrical in shape with a hole in the center, this easily installed dock bumper is designed to cushion ships bumping against their moorings. Various sizes will be available to meet installation specifications. This bumper is made of tough synthetic rubber compounds resistant to rot, aging and effects of corrosive substances says manufacturer, and will be built to withstand pounding. Hewitt-Robins, Inc.

Use the Reader Service Cards provided on pages 195-196 to ask for more information on these products. Circle item numbers of products in which you are interested.

4—INSULATION BOARD for use in duct systems

G-B Insulation Board is composed of longer, finer spun mineral fibers, it is announced, and its principal application is for insulation of heating, ventilating and air conditioning duct systems. According to company, the new product is a semi-rigid insulation with excellent thermal and acoustical properties, easy to cut with a knife to irregular surfaces, and not irritating to handle. It comes in 24-by-48 in. sheets and four thicknesses from ¾ to 2 in. For cooling or combination duct work it is available with vapor barrier. Gustin-Bacon Mfg. Co.

5—ATTACHMENT lets the fork truck shovel snow

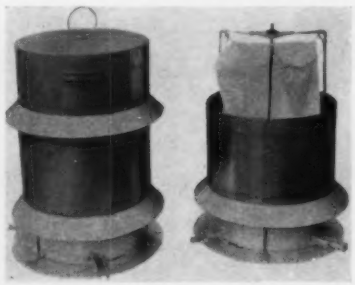
This snow bucket attachment slips on most makes of fork lift trucks to provide a fast, economical method of snow removal. The all-steel bucket is designed to work well in hard-to-reach spots not ordinarily cleared with snow plows. With it, the operator can pile snow where desired, lift over fences or obstructions and load into trucks, says company, and wet, hard-packed snow is easily handled. A heavy grader blade edge aids in cutting through ice. Besides snow removal this bucket attachment can be used for handling bulky materials like coal or sand. Schwartz Mfg. Co.

6—PRESS BRAKE GAGE reduces job set-up time

Reported to save as much as 75 per cent of set-up time, this press brake gage also offers other advantages. Company says it enables setting up a job with more accuracy and requires no make-shift set-ups. Two or a series of gages are fastened to a ¾-by-2 in. bar in the rear of the press brake. Each unit is independent of the other with its own micrometer reading and a lock-nut to lock the reading after setting. A scale on the side of the unit has a pointer for showing the range of 0 to 3½ in. The gage may be set in position by sliding on the bar to the desired location and locking with two thumb screws which are specially designed not to mark up the bar. Addresso Mfg. Co.

7—NYLON BREATHER aids in bulk car venting

This weather-protected nylon breather unit is offered for venting bulk flour transports. When attached to the hatch of a car, van or truck, the breather serves to let air enter the transport during pneumatic unloading and to vent the air during the loading operation. The breather consists of a nylon sock suspended inside a 1-ft, 9-in. diam frame. The stock is clamped at the bottom to a flange resting on the hatch. In operation, the flange replaces the hatch cover of the vehicle and is secured to the opening with the existing hatch clamps. According to manufacturer, the fine weave in the nylon sock retains flour dust, keeps it from being discharged into the atmosphere, and prevents entry of dust and insects.



For all-weather operation, a galvanized steel hood fits over the nylon sock—two shields around the hood's circumference

3—GUIDANCE SYSTEM steers the operator-less tractors

Instead of the guide wire utilized in company's Guide-O-Matic, an electronic industrial tractor requiring no operator, this new development requires only a painted line or a white tape on the floor to transmit guidance to the tractor. Any good grade of white paint may be used, says manufacturer. Light emanating from a small, low-powered bulb in the sniffer box reflects from the white paint or tape on the floor and actuates photoelectric cells in the sniffer box. Thus the tractor steers in the direction of the line. The new optical system is compatible with the present Guide-O-Matic units which follow a guide wire embedded in the floor or anchored to the floor under a tape. The equipment is the same throughout, except for the sniffer box—conversion to the wire type involves simply changing the sniffer box. Also, all features of the wire guidance system are available in the new optical system. Barrett-Cravens Co.

3 years on 93% sulphuric acid at Celanese —no leakage from these Crane valves

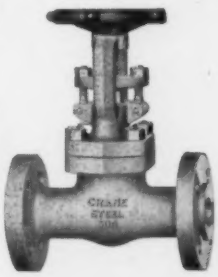
This operator is closing valves with cost records clean as a hound's tooth.

They're Crane 1½-inch No. 3615XW steel gate valves, handling 93% sulphuric acid. Celanese Corporation of America installed them 3 years ago in its large petrochemical plant in Bishop, Texas.

After 3 years on service that's rated severe in any plant's books, these Crane valves are *still* tight, *still* operating easily—and they haven't been opened once for repairs or maintenance.

Unusual? Not with Crane valves. They may look similar to other valves on the outside—but inside, they have the design and materials and construction that can mean the difference between good or poor performance.

That's why so many chemical processing plants *specify* Crane valves. That's why you're always wise to look into the broad Crane line before you buy any valve.



Get the facts from your local Crane Representative, or write to the address below.

CRANE VALVES & FITTINGS

PIPE • KITCHENS • PLUMBING • HEATING

Since 1855—Crane Co., General Offices: Chicago 5, Ill. Branches and Wholesalers Serving All Areas

For more facts circle 584 on Reply Card

NEW PRODUCTS

(Begins on page 144)

serving to keep the rain from reaching the sock. Venting actually takes place through the peripheral openings beneath the shields. A ring, attached to the hood, lets the loading operator drop a line with a hook on the end and "fish" the breather unit up to the top of the car. Company says the breather is light in weight, can be readily handled by one man. Fuller Co.

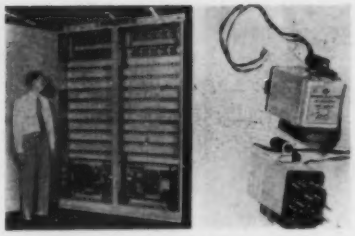
8—MOBILE CRANE can handle a 15-ton load

The S-1510 Crane is designed to lift 15 tons at 10-ft radius with a 30-ft boom. According to company, the crane represents a new low price for 15-ton capacity cranes. Basic design incorporates all the outstanding features of safety, flexibility, maneuverability and economy that have been associated with company's cranes. It is available gasoline or diesel-electric powered costs. Coles Cranes, Inc.

9—pH RECORDER needs no external power supply

Portable, self-contained, pH measuring and recording instruments requiring no external power supply are offered for field surveys of stream pollution, waste-treatment plant effluent, and industrial

water supplies, as well as in-plant studies at locations where a permanently mounted pH recorder is not desired for any reason, or where power is not available. The device consists of two units: Model 524 pH recorder and N-2 amplifier. This equipment is designed to cover the total pH range of 0-14 in two partial ranges of 0-8 and 6-14. Selection is by means of a switch located on the amplifier. The recorder uses carbon-coated 8-in. diam charts, and makes a record with a vibrating stylus. Chart drive can be set to rotate the chart in either 1 hr or 24 hr, depending on the application. The two units together weigh less than 50 lb, and are compactly arranged for easy transport from one location to another. Temperature compensation is by means of a manual adjustment, after reading the temperature of liquid tested. Various electrodes are available. The Bristol Co.



10—STATIC SWITCHING performs control functions

Introduced to accomplish control functions historically performed by contact making devices, such as relays, this new static switching system is designed to aid in automation of various low-power switching operations. It makes available a line of static components to provide the five logic functions basic to intelligence switching: and, or, not, memory, and time delay functions. The logic units and their associated circuit components such as power supplies and output amplifiers, provide a new tool for better performing applications ranging from steel mill processing control systems to control of individual machines, according to company engineers.

The new switching control can be had in component form for use in control design, or in fully engineered panels and systems. Company says the new product can be combined with available regulating systems of the static type, to make possible a co-ordinated over-all static system. Wear, fatigue and other effects of environmental conditions will be greatly reduced, it is claimed, because these switching devices are encapsulated; they have no moving parts, and they employ conservatively rated sub-components. General Electric Co.

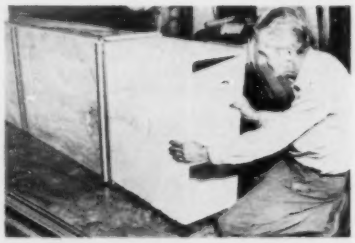
11—LUBE UNIT for machine tool lubrication

Lubro-Control Unit 33AG-4 is offered to meet the need for a small, compact machine tool lubricating unit. The small, 6-by-6-by-5¼ in., cabinet type unit supplies air-actuated feed mechanisms, chucks, clutches, brakes and other air-operated parts of machine tools with filtered air, regulated air pressure and company's Micro-Fog lubrication. Micro-Fog is described as a finely divided airborne oil fog that can be transported great distances with negligible precipitation in air lines and can be appropriately distributed to multiple lubrication points. Among other features of the unit are visible oil feed, lubricator performance over an air flow range of 4 to 85 cfm, simplified maintenance, and in-line pipe connections. Controls and indicators are on the front panel. The unit is designed for main line air pressures not exceeding 150 psi and for regulated air pressures of less than 125 psi. C. A. Norgren Co.

12—SHEAVE for V-belt drives on low horsepower jobs

One- and two-groove Magi-Key Sheaves are offered for quick and easy adjustment of this manufacturer's Texrope V-belt drives in A and B sections. For low horsepower applications, the new sheave is designed to provide for increased maximum design horsepower. For example, company notes, a Magi-Key Sheave, the same size as a former two-groove B section cast iron adjustable sheave, will handle about three times more horsepower.

It is explained that in this new sheave, keys transmit all rotational torque, i.e., from shaft to hub and hub to discs; set screws do not bite into threads. Flexibly joined set screw and key serve to give a positive lock between movable discs and stationary hub, and because the key and set screw always remain joined and in place, they cannot drop out during adjustment or move out of alignment. Bulletin 20B8524 gives further data on the sheaves. Allis-Chalmers Mfg. Co.



13—DUCT LINING insulates against heat, noise

Insul-Coustic is reported to reduce installation costs and provide more effective insulation against both heat and sound. The molded fibrous glass liner is preformed to fit rectangular or circular ducts in a variety of sizes and thicknesses in 4-ft lengths. Lightweight and easy to handle, Insul-Coustic is quickly inserted into the duct, says manufacturer; it doesn't have to be cut to size, there's no waste and no need for pins, clips or adhesives. The interior surface is lined with an open-weave glass cloth to prevent surface erosion and reduce frictional resistance to air flow.

More efficient acoustical insulation is claimed to result from the high sound-absorption characteristics of this duct liner, which serves to absorb noise and eliminate "duct whistle." It also provides thermal insulation advantages of fibrous glass; its K factor is given as 0.25 at 75 F mean temperature. Insul-Coustic has substantial structural strength and resists damage, even with rough handling, manufacturer notes. Insul-Coustic Corp.

14—FLOOR TREATMENT cuts down on paint failures

Most floor paint failures, where paint peels from cement or concrete, are due to improper cleaning or etching of the surface, according to this manufacturer, who offers Sure-Etch as a solution to this problem. Sure-Etch is claimed to etch the floor and clean it—all in a single operation. You simply brush it over the

BAR RUST!

with HORN RUSTBAAR

Rust Inhibitive Coating

A single coat of this remarkable new primer when applied in a thick film (4 mils plus) stops rust from spreading. RUSTBAAR *saves maintenance costs—cuts down the time consuming job of preparing surfaces for painting—eliminates the need for frequent touch-ups and repainting.* There's no need to sand blast. Just remove the flaked rust and RUSTBAAR the remainder.

The secret of RUSTBAAR'S effectiveness lies in the new "ketoxy" compounds which penetrate through the rust to the virgin metal and arrest further corrosion. RUSTBAAR, used in combination with the right top coat, will give you greatly extended life over the average two coat job.

RUSTBAAR is made with a top grade 100% alkyd resin vehicle. It is pigmented with red lead and zinc chromate to provide long-lasting rust-inhibitive action. Mica pigment overlaps within the coating to provide film reinforcement for strength.

RUSTBAAR gives you a two way saving: long years of trouble-free service *plus* lower labor costs in surface preparation. For additional information and technical data write Dept. H38-125.

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DIVISIONS OF SUN CHEMICAL CORPORATION

HORN (paints, maintenance and construction materials, industrial coatings) • **WARWICK** (textile and industrial chemicals) • **WARWICK WAX** (refiners of specialty waxes) • **RUTHERFORD** (lithographic equipment) • **SUN SUPPLY** (lithographic supplies) • **GENERAL PRINTING INK** (Sigmund Ullman • Fuchs & Lang • Eagle • American • Kelly • Chemical Color & Supply Inks) • **MORRILL** (news inks) • **ELECTRO-TECHNICAL PRODUCTS** (coatings and plastics) • **PIGMENTS DIVISION** (pigments for paints, plastics, printing inks of all kinds) • **OVERSEAS DIVISION** (export) • **A. C. HORN COMPANY, LIMITED** (Canada) • **GENERAL PRINTING INK CORPORATION OF CANADA, LIMITED** • **FUCHS & LANG de MEXICO, S. A. de C. V.**

For more facts circle 585 on Reply Card

What's in a name?

MATHEWS

Chain conveyor handling cylinder liners for tractor engines.

This one is on some of the outstanding conveying systems in the Metalworking Industries

Mathews' Engineers have been designing and building gravity and power conveyers and special conveying machinery for over fifty years, and a great amount of this equipment has been applied in metalworking plants. Mathews' Engineers know the handling problems of the metal producers and fabricators. That's why so many people in these industries have an extra measure of confidence in Mathews equipment—and why you see Mathews Conveyers in metalworking plants everywhere.

50 YEARS OF MECHANIZED HANDLING

MATHEWS CONVEYER COMPANY

GENERAL OFFICES . . . . ELLWOOD CITY, PENNSYLVANIA

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SAN CARLOS, CALIFORNIA

CANADIAN DIVISION . . MATHEWS CONVEYER COMPANY, LTD.
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Engineering Offices or Sales Agencies in Principal American and Canadian Cities.
Export Representative—Foreign Trade Division of New York Hanseatic Corp.

For more facts circle 586 on Reply Card

NEW PRODUCTS

(Begins on page 144)

area to be painted and a bubbling process begins which, in 30 sec, opens the floor pores, it is explained. After rinsing and drying, the floor is ready for painting. Sure-Etch is suggested for food processing plants, garages and other plant areas involving acids, alkalis, oils, grease and other stubborn floor conditions that resist usual cleaning methods. Coverage is about 200 to 250 sq ft per gallon, depending on dirt and grease to be removed from the concrete. Colonial Refining and Chemical Co.

15—UNIT HEATER offers safety and economy

This economical electrical unit heater uses a non-glowing black heat type element with a fan blade designed to provide an even, efficient flow of heated air. The replaceable element itself is steel

covered and protected against overheating by a built-in thermal cutout. Manufacturer's safety design eliminates bare wires or terminals in the air stream, it is noted, and the totally-enclosed, sealed-bearing motor is reported to provide long service with maximum safety. The unit is designed for continuous or automatic control to maintain temperatures as required. For normal service sizes range from 1½ to 7½ kw. Extra heat capacity units range from 9 to 15 kw. Bulletin 806 gives specifications on the heater. Ilg Electric Ventilating Co.

16—PLASTIC TAPE for magnetic recording use

Plastic leader and timing tape, Scotch brand No. 43-P, is announced as featuring an anti-static coating and a 50 per cent increase in strength over company's previous paper leader tape. The coating is said to reduce noise as the tape passes over the playback head and to make the tape easier to handle, while the increased strength reduces possibility of breakage. To be spliced to the beginning and end of a reel of magnetic tape, the new non-magnetic tape provides a tough protective leader that makes for easier thread-up and prevents damage to recorded material. As a timing tape it can be inserted between recorded selections to provide

For more facts circle 587 on Reply Card →

WHAT?

AB-I's cost less than safety switches?

YES!

In many cases Westinghouse AB-I circuit breakers do. And check the other concrete benefits that safety switches can't match.

You realize definite reductions in wiring costs: because the enclosure is installed first and unit breaker wired later, there is no obstruction to pulling wires. At the present-day electrician's rate of pay, this adds up to real dollar savings.

In order not to tie up your capital until breakers are actually needed on a job, you may purchase the enclosure only. Westinghouse unit breakers are sold separately for your convenience.

Don't these reasons prove to you that Westinghouse AB-I breakers are today's best circuit protection buy?

J-30222

WATCH WESTINGHOUSE!

*WHERE **BIG** THINGS ARE HAPPENING FOR **YOU**!*

the new **TOUGHER**

• **GENERAL PURPOSE**

PLASTIC PIPE

ACE-ITE is a new moderately priced rigid plastic pipe with exceptional impact strength and toughness . . . handles most corrosive fluids in your plant at moderate temperatures and pressures.

For piping most inorganic acids, salts, alkalis and many organic chemicals, it's the equal of plastics that cost far more. ACE-ITE maintains good strength, rigidity and chemical resistance from minus 40 deg. F. to 170 deg. F. Light in weight, it is odorless, tasteless, non-contaminating. Saves cost of painting, immune to electrolytic corrosion and bacteria. Available in pipe sizes from ½" to 6", standard and extra-heavy, with wide variety of fittings.

ACE-ITE is only one of eight types of rubber and plastic pipe now offered by American Hard Rubber Company. Write today for free technical Bulletin 80.

ACE rubber and plastic products

AMERICAN HARD RUBBER COMPANY

93 WORTH STREET • NEW YORK 13, N. Y.

For more facts circle 588 on Reply Card

NEW PRODUCTS

(Begins on page 144)

"dead air" or to facilitate cueing. It can be labeled or identified with pencil or ball point pen. Tape is ¼ in. wide by 150 ft long. Minnesota Mining and Mfg. Co.

17—CONVEYOR is light in weight, and versatile

Handy-Boy is a light-weight, all-purpose conveyor claimed to possess unusual performance versatility. Described as compact and maneuverable, yet rugged and durable, the Handy-Boy Model A conveyor includes bed made of heavy gage, heat treated aluminum, reversible movement of adjustable tension belt, full complement of wheel, stand and feeder attachments. Hinged mounting brackets are available for attaching Handy-Boy to the wall of a staircase. Thus, the conveyor can be tipped on its side when not in use, allowing free access to stairs. Conveyor is being made available in eight sizes. They range from 6 to 20 ft in length. .Hytrol Conveyor Co.

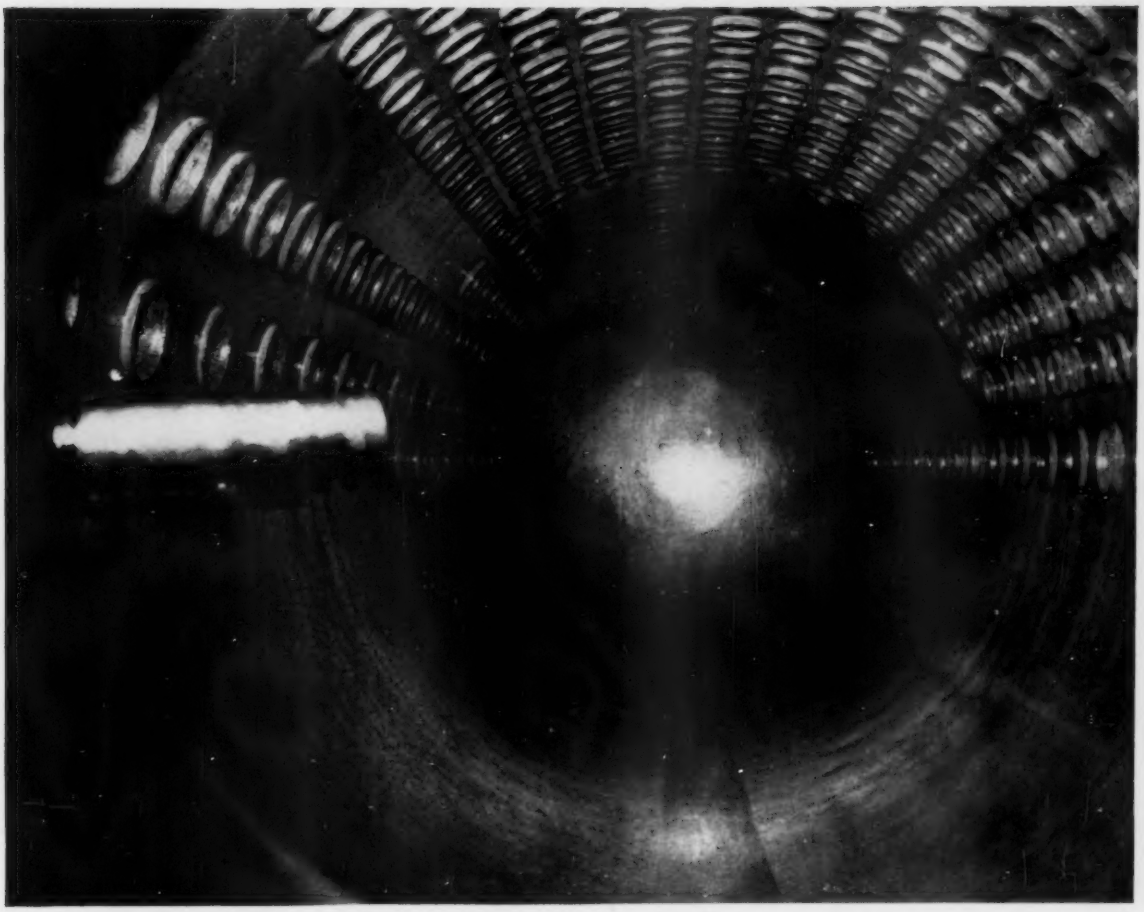
18—SCRIBING TOOL has a solid carbide tip

Designed for faster die layout, scoring, engraving and marking in tool rooms, machine tool repair shops, industrial plants and sheet metal shops, as well as indicating dates on production equipment

and business machines, the Micro-Scriber can be utilized to scribe or etch all metals including hardened steel, aluminum, corrugated sheet, brass, bronze, monel, and precious gems, glass, ceramics and plastics. It has a solid carbide tip, diamond ground and precision lapped, secured in a polished aluminum handle hexagonal in shape so it won't roll. Each Micro-Scriber is sealed within a clear plastic bubble for added protection. The tool sells for about $1.00, is shipped 24 to a carton. The Greist Mfg. Co.

19—WIRE MARKERS for use in oily conditions

Oil immersed wire leads are permanently identified with these wire markers having epoxy resin backings, it is claimed—they withstand continuous immersion in Pyranol or 10C transformer oil and operating temperatures to 350 F. They were developed for oil-immersed wire leads in



No Sludge . . . No Scale . . . No Corrosion in this boiler

Opened for inspection, this large boiler drum shows the results of a year's attention to good water treatment: *nothing!* No sludge, no scale, no corrosion . . . Ready to go back on line without even a wash-out . . . Down time and maintenance minimum, fuel economy and operating efficiency tops . . . Thanks to The Nalco System of Water Treatment, and good plant control practices.

Nalco System treatment includes proper water treating chemicals *plus continuing Nalco service* that assures effective protection for your steam and water system—from raw water intake through condensate return lines.

For prompt action and straightforward assistance on any water treatment problem, call on Nalco.

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CANADA: Alchem Limited, Burlington, Ontario
NORTHWESTERN UNITED STATES, HAWAII and ALASKA
The Flox Company, Inc., Minneapolis 3, Minnesota
ITALY: Nalco Italiana, S.p.A. SPAIN: Nalco Espanola, S.A.
WEST GERMANY: Deutsche Nalco-Chemie GmbH

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and for:

- PROCESS ANTIFOAMS AND COAGULANTS
- SLIME AND ALGAE CONTROL
- PAPER MILL PROCESS CHEMICALS
- ION EXCHANGE
- WEED AND BRUSH CONTROL
- COMBUSTION CATALYSTS
- PETROLEUM CATALYSTS
- FUEL OIL STABILIZATION
- OIL WELL AND REFINERY CORROSION CONTROL

THE *Nalco*® SYSTEM . . . SERVING INDUSTRY THROUGH PRACTICAL APPLIED SCIENCE

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How to cut costs on
HEAVY-DUTY ELEVATORS

ROTARY OILDRAULIC ELEVATORS need no penthouse or heavy shaftway

Savings to 25% are possible with Rotary Oildraulic Elevators which are moved, supported and controlled by an oil-hydraulic jack. This modern elevator for rises to 55 feet needs no expensive machinery penthouse and no heavy loadbearing shaftway structure.

These savings in original construction costs are matched by lower operation expense. Oildraulic operation provides maximum power efficiency, and consistently dependable, maintenance-free performance.

Rugged construction to withstand the shocks and jolts of mechanized plant traffic is inherent in the Rotary Oildraulic Elevator design. Automatic floor leveling within ¼" is guaranteed. Car sizes, capacities and controls supplied to your requirements.

More than 100,000 Rotary Oildraulic Elevators and Lifts are now in use. Efficient installation and maintenance service is provided by a nationwide distributor organization. Look for "Rotary Oildraulic" under "Elevators" in your phone book or mail coupon for freight and passenger elevator catalogs.

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Send catalog on ☐ freight ☐ passenger elevators to:

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Address_____

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For more facts circle 590 on Reply Card

NEW PRODUCTS

(Begins on page 144)

distribution transformers, high-voltage transformers, voltage regulators and specialty transformers, but are suggested for any application where oil conditions are present. The epoxy resin backing is heat activated. Adhesive at each end of the marker holds it tightly wrapped around the wire leads, company explains; the wire leads are baked, activating the epoxy resin into a permanent, solid, oil-proof bond. Mounted on handy dispenser liners, these markers are made to order. Literature and testing sample are offered. W. H. Brady Co.

20—PVC EDUCTORS for liquid pumping, mixing

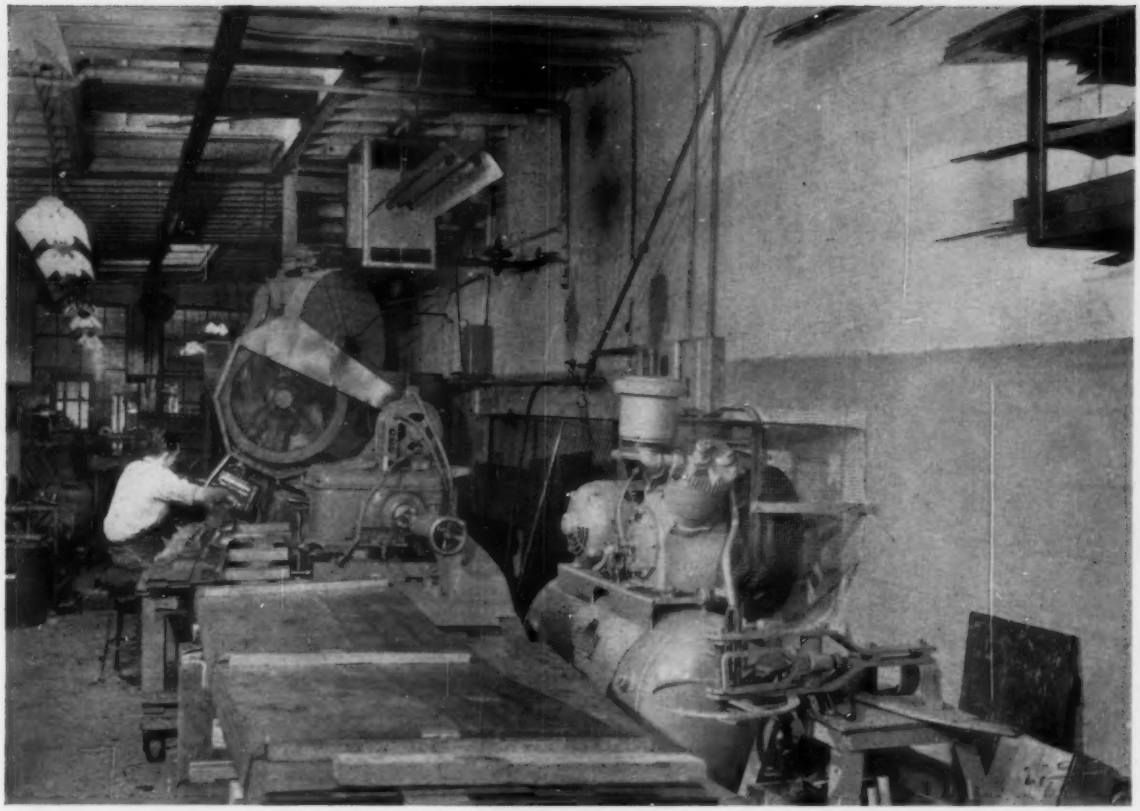
Designed for use in liquid pumping and mixing operations, especially those employing corrosive fluids, these PVC eductors can also be used to handle solids when particle size permits. Polyvinyl chloride offers exceptional resistance against many corrosive media, it is pointed out, in some cases surpassing that of high grade steels and alloys. Materials not to be handled include acetone, ketones, ethers, esters, or aromatic or chlorinated hydro-carbons manufacturer states. The new line comprises six standard sizes from ½ to 3 in. with performance characteristics similar to those of metal eductors of equivalent size. PVD eductors have maximum ratings of 125 psi, 160 F. Schutte and Koerting Co.

It's easy to obtain product data with the postage-free Reader Service Cards provided on pages 195-196. Use them for information on advertised products, too. Just circle the key number appearing at bottom of the ad.

21—PIPED FIRE SYSTEM is dry chemical type

For flammable liquid, electrical and textile fire hazards, this compact, low-cost automatic dry chemical fire extinguishing system can be operated automatically or manually. It is intended for protection of moderately-sized hazards, such as paint spray and dip operations, small transformer vaults, heat-treating and oil quench operations, overhead cranes, stationary engines, lint hazards. Called the PS-30, it consists of a 30-lb capacity dry chemical unit installed near the hazard and serving as a storage tank for the dry chemical. A CO_2 gas pressure cartridge furnishes pressure to expel the chemical onto the fire through piping. The system can provide total flooding or local application.

Automatic operation occurs when fire heat causes a fusible metal link located



Punching Out Extra Profits

Dependable Westinghouse Air Compressor supplies versatile, economical air power to raise production and lower costs

That's just what the operator of this punch press is doing — punching out the extra profits that result from increased production.

And it's a Westinghouse Air Compressor that's responsible for his greater output.

Why? Because Westinghouse Air Compressors have 15 features not found in any other compressor — features that mean greater dependability and greater efficiency for low-cost operation. Here they are:

Type M inlet filter, disc valves, enclosed crankcase, anti-friction main bearings, pressure lubrication, low oil level protection, enclosed starting unloader, adequate cooling fins, "Y" type construction, high velocity fly-wheel fan, large size intercooler, thermal overload protection, greater weight, dual control, and one-year warranty period.

Let compressed air help you punch out those extra profits with its versatility. And guarantee yourself a trouble-free source of supply by using Westinghouse Air Compressors. Sizes up to 40 hp — write for latest literature.

W-102

LE ROI *Division of Westinghouse Air Brake Co.*

Milwaukee 1, Wisconsin

PORTABLE AIR COMPRESSORS · TRACTAIR · STATIONARY AIR COMPRESSORS · AIR TOOLS · ENGINES

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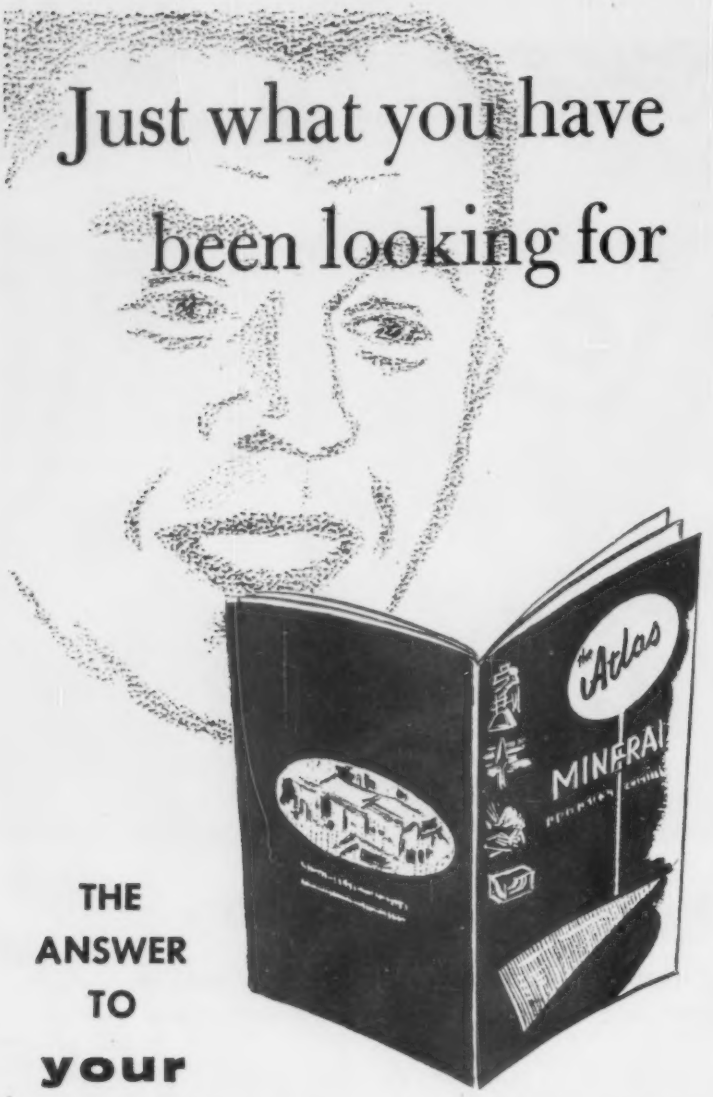


THE ANSWER TO your corrosion problems

A completely new sixteen page bulletin on corrosion proof materials of construction. . . . Individual sections on CORROSION PROOF CEMENTS, PROTECTIVE COATINGS, TANK LININGS and RIGID PLASTIC STRUCTURES and PIPE . . . also sections including engineering design and corrosion resistance charts.
This bulletin is filled with valuable information on 18 materials that can be used to give you plant-wide protection from corrosion.

FOR YOUR COPY
WRITE TO

ATLAS MINERAL PRODUCTS COMPANY
MERTZTOWN, PENNSYLVANIA

TECHNICAL REPRESENTATIVES THROUGHOUT THE UNITED STATES
For more facts circle 592 on Reply Card

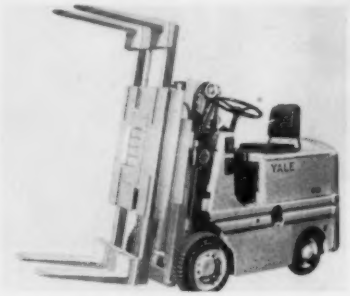
NEW PRODUCTS

(Begins on page 144)

above the hazard to part. The impulse is transmitted to the release mechanism at the dry chemical unit. This mechanism causes the cartridge to be punctured, pressurizing the extinguisher and forcing its charge into the piping leading to the nozzles. Accessory equipment, such as remote manual pull stations and devices for ringing alarm bells, shutting down motors, etc., is available. The PS-30 can be recharged on the spot. Ansul Chemical Co.

22—FORK-CLAMP gives truck more versatility

This heavy duty, dual purpose, rotating industrial lift truck attachment is designed to let the truck double as a standard fork truck and as a textile or paper bale handler. Thus, it permits handling of two dissimilar loads with the same truck.



The attachment uses two sets of hydraulically controlled, 8-in. wide forks mounting on opposite sides of the fork carriage for clamping surfaces. Used as a clamp, it can pick up, lift and carry bales from 27 to 75 in. wide. The 360-deg rotating characteristic of the fork carriage permits either horizontal or vertical placement of the load. With the upper set of clamping arms extended out of the way the attachment can be used to handle pallet loads up to 75 in. high. Either set of forks can be used to carry pallets by rotation of the attachment. It is noted that on a 5000-lb capacity truck, the attachment can handle loads to 3200 lb at 24-in. load center. The Yale & Towne Mfg. Co.

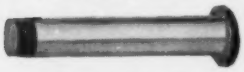
23—WELDER, constant voltage, permits better control

These modified constant voltage welders, available in 300, 500, 750, and 1200-amp units, are designed to permit better and fuller control over a wide range of applications. Main feature of the machines is an adjustable slope control that is said to give a softer arc, eliminate burn-back and stubbing, and provide a stable, spray-type deposit when properly adjusted for aluminum, stainless steel, and other alloys. The adjustable feature of the control is also available in smoothing out both semi-automatic Unionmelt and open-

"Stress raisers" eliminated by Link-Belt LXS chain design

LXS "FULL-ROUND" DESIGN

"Full-round" pitch holes . . . no sharp corners



"Full-round" pin

"Full-round" bushing

"FULL-ROUND" DESIGN eliminates stress concentration points. Heat treatment of all parts adds even greater strength and extra wear life to selected steels. Accurate control of these processes avoids brittleness, poor wear values and low tensile strengths . . . and assures uniformity.

Large pins, bushings mean ample live bearing area for long life

For long life under severe conveyor and drive conditions, Link-Belt LXS chain provides extra strength, increased wear resistance and wider application flexibility. This fabricated steel roller chain incorporates many advanced design and manufacturing refinements, resulting in superior ruggedness and accuracy.

Eliminate weak points

"Full-round" design does away with stress concentration points most frequently subject to failure . . . provides maximum live bearing area between pin, bushing and sidebars. As a result, stress is distributed evenly, increasing chain life.

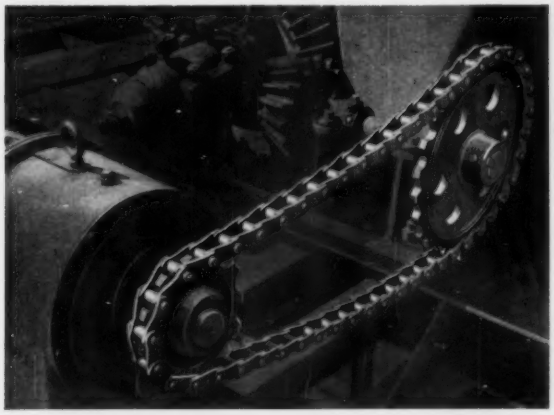
Pins and bushings are accurately sized for controlled press fit, preventing rotation in sidebars. Made from selected bar steel, sidebars are carefully machined for proper pitch hole size and for maintaining firm, tight press fit of pins and bushings. This assures close control of pitch and proper chain length after assembly.

Hardening extends life

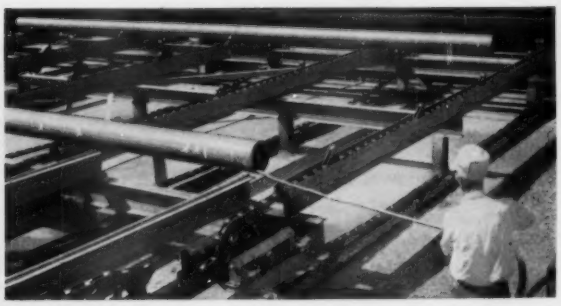
Another Link-Belt long-life extra is the controlled hardening of selected steels used in the manufacture of LXS chain. Pins, for example, are made from a tough steel, specially treated for high strength in shear and for maximum wear value. Bushings are properly hardened to shrug off shock and resist wear.

Rollers are accurately machined to assure proper operating clearances and free-rolling action. Controlled hardening gives them the necessary resiliency and durability.

LXS especially popular for exposed drives, high impacts



Link-Belt LXS chain is the long-life answer for exposed drives, abrasive and high-impact conditions. Its large, live bearing area reduces cutting action of abrasives because load is spread over a broad area.



LXS chain provides extra strength, wear-life for heavy-duty conveying

Link-Belt LXS chain has real stamina—as shown in this conveyor application for handling 1000-pound, 40-foot lengths of steel pipe. Thanks to accuracy of pitch and attachment spacing, plus close matching of multiple strands, LXS has the added strength and wear life for the extra-long conveyors so popular in today's move to mechanization.

HEADQUARTERS FOR CHAINS, SPROCKETS is your nearby Link-Belt factory branch store or authorized stock-carrying distributor. Write for 342-page Catalog 950.

LINK-BELT

CHAINS AND SPROCKETS

LINK-BELT COMPANY: Executive Offices, Prudential Plaza, Chicago 1. To Serve Industry There Are Link-Belt Plants, Sales Offices, Stock Carrying Factory Branch Stores and Distributors in All Principal Cities. Export Office, New York 7; Canada, Scarboro (Toronto 13); Australia, Marrickville, N.S.W.; South Africa, Springs. Representatives Throughout the World. 14,257

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GOULDS PUMPS, INC., Seneca Falls, New York

Check bulletins you'd like to receive:

☐ Pump Fundamentals. A brief outline of the characteristics, operation and criteria for selecting reciprocating, rotary, and centrifugal pumps.

☐ 710.1 "Close-cupld" Centrifugal Pumps.

☐ 721.6 Single-stage Double-suction Pumps.

☐ 725.4 Centrifugal Chemical Pumps.

☐ 726.1 Vertical Centrifugal Pumps.

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How to buy a better pump

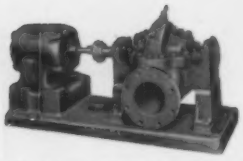
When you have to choose from dozens of pumps of different types and brands, it's hard to tell which will work best for you at the least cost.

However, when you know what to look for and how to look, you can match a pump to your needs almost exactly.

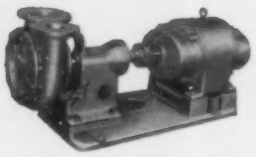
Just five of hundreds of bulletins we've prepared to help you buy wisely and well are offered above. Send for them and use them when you need a general purpose pump.

When you have a particular application in mind, write us the essentials. We'll be glad to advise you on the pump or pumps that will work best for your purpose.

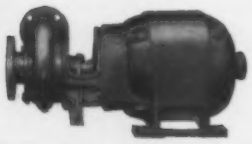
4 general purpose pumps



1. For large capacity pumping, the Goulds Fig. 3405. 33 sizes with capacities up to 6400 GPM; heads to 425 ft. Send for Bulletin 721.6.

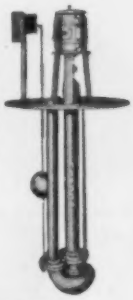


2. For economical handling of hot, corrosive or abrasive liquids, the Goulds Fig. 3715 stainless steel pump. 9 sizes with capacities up to 720 GPM; heads to 200 ft. Send for Bulletin 725.4.



3. For use where space is at a premium, the Goulds Fig. 3655 "close-cupld" pump. 20 sizes with capacities up to 2000 GPM; heads to 400 ft. Send for Bulletin 710.1.

4. A submerged-type sump pump for depths of 3 to 20 ft., the Goulds Fig. 3047. 4 sizes with capacities from 10 to 650 GPM; heads up to 65 ft. Send for Bulletin 726.1.



Goulds PUMPS INC. Seneca Falls New York

SALES OFFICES: Atlanta • Boston • Chicago • Houston • New York • Philadelphia • Pittsburgh • Tulsa

For more facts circle 594 on Reply Card

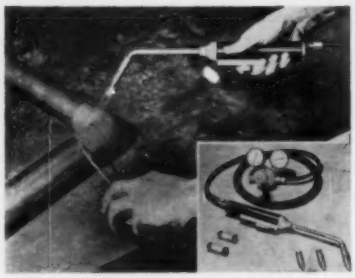
NEW PRODUCTS

(Begins on page 144)

arc steel welding, and is designed to eliminate possibility of erratic welds due to high current surges while working on difficult welding jobs. The chief advantages claimed for constant-voltage welding are simplified operation, lower installation and power costs, and X-ray welds for inert gas, submerged arc, semi-automatic and all metallic-arc automatic welding processes. The new development extends these advantages to a greater variety of applications and to jobs where it is necessary to change electrode sizes. Welding Div., Harnischfeger Corp.

24—ACETYLENE TORCH lights up automatically

The Torch-O-Matic is designed to light automatically when you press the control lever, and shut off instantly when not in use. It is said to be the first acetylene torch to light automatically from battery-powered ignition and to combine safety and economy in a torch which can be



used for dozens of heating, soldering, sweating and brazing operations. There is no lock-on position for the control lever. This, company states, assures automatic shut-off when torch is not in actual use. Pressing the lever simultaneously opens the torch gas valve and creates an electric spark which ignites the gas.

Described as slender and well balanced, the 12-oz torch provides a flame of about 3000 F and is adaptable to a wide range of jobs through use of interchangeable nozzles or tips in three sizes. In the plastic handle are two small penlite dry cell batteries. Bulletin 1413-7 gives full details. Velocity Power Tool Co.

25—ALUMINUM PAINT takes temperature to 1700 F.

C-I Extra High is announced as an aluminum paint capable of withstanding temperatures up to 1700 F without blistering or burning. It is composed of a clear silicone base with special aluminum flake pigment, a combination said to air dry to a bright finish in about 30 min—and, when heated, to virtually fuse with the surface upon which it is applied. According to manufacturer, C-I Extra High forms a metal coating that resists moisture, corrosion, mild acids, alkalis and oven fumes. It is suggested for use on

Edward E. McIlveen, Okonite's Assistant Manager of Engineering shows:

Why Loxarmor* is the low cost alternative to conduit

Rubber-insulated Loxarmor* cables provide an ideal combination of flexibility, light weight and mechanical strength. Where rigid conduit is not desired, Loxarmor is the No. 1 alternative for either power or control circuits. Here's why:

Material and installation costs are lower. Eliminates conduit and related installation procedures such as making bends and using pull boxes. It is especially useful in cramped quarters.

Circuits are easily added or re-routed—usually trained in trays or racks, Loxarmor cables can be easily moved.

Easy accessibility reduces down-time—permits quick inspection. Can be installed indoors and outdoors.

Loxarmor occupies less space—not much more than half the space is required for multiple Loxarmor circuits vs. circuits in conduit.

Loxarmor can be supplied over any standard Okonite insulation—depending upon your installation conditions and voltage requirements. It is available in galvanized or stainless steel, aluminum, bronze or copper.

For dimensional data on Okonex (*one* of Okonite's standard rubber insulations) with Loxarmor plus splicing and terminating drawings and instructions, write for Bulletin EC-1090. The Okonite Company, Passaic, N. J.

*Interlocking S-shaped armor

Available with either copper or aluminum conductors

4161

where there's electrical power . . . there's **OKONITE CABLE**

For more facts circle 595 on Reply Card

For more facts circle 596 on Reply Card

NEW PRODUCTS

(Begins on page 144)

condensers, heat lines, oven compressors, engine heads, and, because of its heat resistance, on many surfaces formerly considered unpaintable. It may be applied by brush or spray. Chem Industrial Co.

26—VALVES for use with corrosive fluids

Relief valves and back pressure valves are announced for use with corrosive fluid at pressures to 1500 psi and temperatures to 250 F. The topworks of these valves are protected by Kel-F thermoplastic diaphragms. Available in four standard sizes from ¼ to 1 in., these valves offer a wide range of pressure settings which can be made with a screw driver. For high corrosion resistance, valve bodies are of cast steel, 316 stainless steel, Carpenter 20 and Hastelloy C. Specifications are in Bulletin 1255-B. Milton Roy Co.

27—FLOOR BRUSH is angled for longer wear

This floor machine brush, the Angle-Set, has its tufts set in a slightly slanting position opposing the direction the brush turns. It is said that this setting keeps only the tips of the bristles in contact

with the floor—improving efficiency and increasing brush life 30 per cent or more. Most brushes, especially polishing ones, seldom actually wear out, it is explained. Instead the bristles lay over, losing much of their effectiveness. Angle-Set Brushes are designed to provide for the bristles being in their most efficient position after the normal bending or rearward inclination has taken place, to assure their operation at right angles to floor surface. These brushes come in standard floor machine sizes. Advance Floor Machine Co.

28—MOLDED INSULATION has wide temperature range

Kaytherm is a molded insulation for steam and heated process piping. It is announced as highly effective low conductivity insulation capable of withstanding pipe temperatures up to 1350 F. Produced in half-cylindrical sections and segments 36 in. long, Kaytherm is declared easy to install, requiring only simple encircling metal bands to fasten two mating sections to a pipe. It can be

LOOK FOR THE JENKINS DIAMOND

MADE BY THE ORIGINATORS OF RENEWABLE DISC VALVES

Jenkins Bros. has remained the leader in composition disc development and production since 1864, when the first renewable disc valve was introduced.

THE ONLY MANUFACTURER OF BOTH VALVES AND DISCS

Jenkins Bros. devotes continuous laboratory and field research to disc improvement through use of new compounds, and new production techniques.

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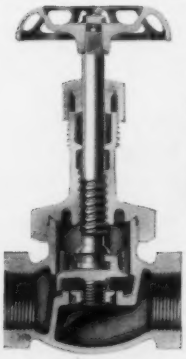
Describes all Jenkins Discs, and their applications for steam, hot and cold water, air, gas, oil, gasoline . . . including the new TEFLON® DISC for lasting, dependable control of oxygen and other gases, solvents, acids, alkalies, and other chemicals,— and for liquid food and similar services.

Ask your Jenkins Valve Distributor for Disc Folder Form 203, or write: Jenkins Bros., 100 Park Ave., New York 17.



. . . for highest efficiency, use the time-proved combination . . . JENKINS DISCS in

JENKINS VALVES

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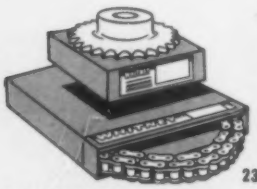
POSITIVE
APPROACH
TO PRODUCTION PROBLEMS

Whitney Chain Drives
Transmit one or hundreds of horsepower . . . provide split second timing motion . . . keep conveyor systems operating! Whatever your design requirements, Whitney's complete, versatile line of finished steel chain drives simplify production problems and slash costs. Whitney Chain Drives are proven by countless industrial cost and performance records on all type equipment. Operating long or short centers, driving shafts clockwise or counterclockwise, singly or simultaneously . . . Whitney Chain and Standard Attachments offer adaptability to meet your toughest demand.

Whitney Chain brings you lowered costs, thanks to a "built-in" ruggedness acquired by 60 years' design and manufacturing experience. Whitney was first in the use of alloy chain . . . and in many drive developments including the recently introduced Self-Lubricating Roller Chain.

Whitney field engineers throughout the U.S. can help solve your drive problems. Your nearby Whitney distributor provides "off-the-shelf" service for fast replacements.

Catalogs on request —



Whitney
CHAIN COMPANY
232 HAMILTON STREET • HARTFORD 2, CONN.
CREATORS OF SELF-LUBE CHAIN

ROLLER CHAIN • SILENT CHAIN • CONVEYOR CHAIN • SPROCKETS • FLEXIBLE COUPLINGS
For more facts circle 598 on Reply Card

NEW PRODUCTS

(Begins on page 144)

cut and worked with ordinary tools, and comes in thicknesses from 1 to 4 in. for pipes up to 33 in. diam.

Kaytherm is made by reacting lime and diatomaceous earth under conditions of heat and water to form a hydrous calcium silicate which is bonded together with asbestos fibers. According to company, this chemically stable material has many favorable characteristics of fine concrete such as strength, wear resistance and dimensional stability. Kaytherm sections are described as light in weight, easy to handle. The material is reported flame resistant, insoluble in water. Keasbey & Mattison Co.

29—TINY AIR COMPRESSOR for small painting jobs

About the size of a bowling ball and weighing only 45 lb, the 303 Compressor was developed for use in small spray painting jobs. Manufacturer calls it the answer to odd projects—partitions, missed spots, pieces of equipment, office furniture—anywhere it is not practical to haul out the big compressor, where there's no handy compressed air takeoff. The 303 has no exposed moving parts or belts, says company, yet it is sturdy and efficient and there is enough air from the ½-hp electric motor to handle a variety of paint. The compressor will carry company's Jr-46 or G-6 spray guns with special nozzles. It costs less than $100. Eclipse Air Brush Co.

To receive product data circle item numbers on the handy Reader Service Cards provided on pages 195-196.

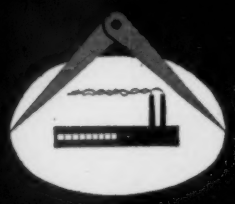
30—PROTECTIVE COATING offers increased benefits

A new formula for Thick-Coat is announced as having greater sunlight and weather resistant properties and being lower in price. It is described as a 63 per cent solids protective coating having the easy application characteristics of a paint, but offering protection against medium to severe corrosive conditions. Pennsylvania Salt Mfg. Co.

31—TRANSPARENT TAPE has a special backing

Called simply No. 66, until a brand name is selected for it, this pressure sensitive tape utilizes a polyethylene-surfaced cellulosic backing. At the outset, it will be available in ½-in. wide rolls, 2592 in. long. The polyethylene surfacing on the tape backing contributes several advantages. Company says the tendency toward accidental breakage of most cellophane

Using DU PONT ELASTOMERS
NEOPRENE • HYPALON®



in Industry

2 years' exposure to strong acids—but HYPALON® OUTLET VALVE STILL IN PERFECT CONDITION

Valve maintenance and replacement were running up costs for Industrial Wastes, Inc., of Beaver Falls, Pa. The firm handles some 2½ million gallons of spent acids monthly—and the outlet valves on their tank trucks were being eaten away by sulfuric, nitric, hydrochloric and hydrofluoric acids.

Then about 2 years ago, they tried a butterfly valve lined with HYPALON (see exploded view below). The valve is still in use today. In addition to greatly reduced maintenance, the new valve offers economy in size and space, a more efficient flow, and a saving of 40% on initial cost.

Key part in the valve is the resilient HYPALON sleeve which resists deterioration from strong oxidizing acids. This new Du Pont synthetic rubber offers you other exceptional properties for extreme industrial service conditions. It is completely unaffected by ozone and has unusual resistance to hardening at elevated temperatures (250°-350°F.). And HYPALON can be compounded in a complete range of weather-resistant colors.

We'll be glad to send more information about HYPALON—its properties and uses. Just clip and mail the coupon.

Butterfly valve with sleeve of resilient HYPALON has been in service for over two years handling sulfuric, nitric, hydrochloric and hydrofluoric acids.

For more facts circle 599 on Reply Card

Girls brush grease on metal parts before dropping them on neoprene conveyor belt.

NEOPRENE conveyor outlasts canvas belts 4 to 1 handling greasy metal parts

STILL IN USE AFTER 2 YEARS

At a large sub-assembly plant, employees brush grease on individual component parts so that the parts fit together easily and are lubricated and ready for use when the finished unit reaches the end of the production line. During assembly the part is picked up and dropped back onto the belt 15 to 20 times. Canvas belts were formerly used, but the grease caused severe deterioration, and the belts generally had to be replaced in six months.

Two years ago, the plant began a side-by-side test of conveyor belts for this operation. One belt was canvas; the other, neoprene, Du Pont's synthetic rubber. Today the neoprene belt is still in service, while the *fourth* canvas belt operates beside it—striking proof of neoprene's resistance to grease, aging and abrasion from sharp metal parts.

Many small parts, coated with lubricating oil, are turned out automatically in this plant. Neoprene conveyors are used for each operation. Some are short-lift conveyors with molded neoprene flights used at individual machines. Others are long horizontal lines serving entire batteries of stamping presses. One engineer says: "We use neoprene belts because they're oil-resistant, match rubber's abrasion resistance, and are more water-resistant than canvas."

Why not let the advantages of neoprene products reduce maintenance and replacement costs in your plant? Neoprene offers long life under exposure to ozone, weathering, sunlight and chemicals—and its flame resistance is a strong benefit in modern factory design. Ask your supplier for neoprene v-belts, gloves, hose and conveyor belts. They'll reward you with long, cost-saving service. For more information, mail coupon.

DU PONT
REG. U. S. PAT. OFF.

HYPALON *is a registered trademark of E.I. du Pont de Nemours & Co. (Inc.)*

BETTER THINGS FOR BETTER LIVING . . . THROUGH CHEMISTRY

☐ I am particularly interested in _____

☐ Please add my name to the mailing list for your free publications, "The Neoprene Notebook" and "Facts about HYPALON."

E. I. du Pont de Nemours & Co. (Inc.)
Elastomers Division, Dept. PL-12
Wilmington 98, Delaware

Name _____
Firm _____
Address _____
City _____ *State* _____

Acco Registered* Sling Chains

NEW!
Shaped Section Master Link
Holds its form under loads up to 18% greater.
NEW!
Accoloy X-Weld 125 Chain
Welds as strong or stronger than alloy material. Welded area 2¼ times conventional size area.

*Trade Mark Registered

New X-weld Chain— New Master Link

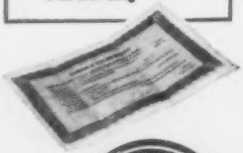
• The best has been made even better! ACCO *Registered* Sling Chains, recognized everywhere as the finest sling chains on the market, have now been made *still stronger and safer* by incorporating ACCO's great new Accoloy X-weld 125 chain and ACCO's new Shaped Section Master Link.

The Accoloy X-weld 125 chain is non-kinking. Each link has an oversize welded area with welds of full alloy strength. This means extra ruggedness and longer service life. The new Shaped Section Master Link weighs no more, but it withstands deformation under loads up to 18% greater than a conventional round section can.

Next time you buy sling chains, get ACCO *Registered* Sling Chains—they are better than ever! For full details, call your ACCO *Registered* Distributor—or write our nearest District Office.

WHAT "ACCO REGISTERED" MEANS

1. The best material
2. Unit safety factor (on bodies, rings, links, hooks)
3. Proof test of complete sling to twice the working load limit
4. Actual field service test of each design
5. Metal identification ring on each sling
6. Signed Registry Certificate with each sling



ACCO

American Chain Division
AMERICAN CHAIN & CABLE

TRADE MARK

York, Pa., Atlanta, Boston, Chicago, Denver, Detroit, Houston, Los Angeles, New York, Philadelphia, Pittsburgh, Portland, Ore., San Francisco, Bridgeport, Conn.

plus Rings Links Hooks

For more facts circle 600 on Reply Card

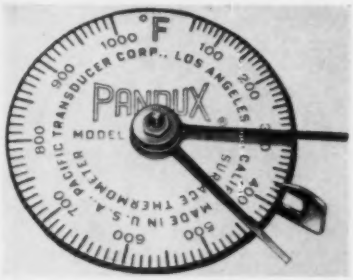
NEW PRODUCTS

(Begins on page 144)

tapes is largely overcome in this new product. The adhesive is a long-aging, pressure-sensitive, clear resinous material. The top surface of the tape itself is claimed resistant to acids and alkalis, and impermeable to greases, oils, and powders. It possesses dimensional stability with flexibility at low temperatures, says manufacturer, and has extremely long life, yet it is not subject to brittleness and drying. General Tape Corp.

32—THERMOMETER shows maximum-minimum temp

Of stainless steel, with a range of 50 to 1000 F, the Model 575M Maximum-Minimum Spot Check Thermometer has two ancillary pointers which show the maximum and minimum excursions over any desired period of time. The maximum



and minimum pointers can be re-set whenever a reading is taken. Compact in size, the thermometer's diameter is 1¾ in. It weighs ½ oz. It is designed to read temperature of all surfaces, including heavy sheet metal, large super-heated pipes, furnace skins. Besides surface temperatures, it also provides a maximum-minimum record of temperatures in furnaces and other enclosed spaces, as well as non-corrosive liquids and gases up to 1000 F. An alnico magnet is provided for attachment to ferrous surfaces when the unit is used in vertical position. It costs less than $7.00. Pacific Transducer Corp.

33—VENTILATOR-HEATER has sectionalized design

Nine unit combinations are offered in the Torrivent line, ranging from a basic model supplying untempered make-up air to a deluxe model that provides heating, ventilation and humidification. The deluxe model includes an insulated and baffled disharge plenum with insulated enclosure for motor mounting, fan section and coil with attached face and bypass section, and a combination filter-mixing box. Outside air is brought into the model through a wall intake box featuring chevron rain baffles and a protective screen. The Torrivent is especially designed for use in large buildings requiring ventilation with heating.

Engineered to deliver large air volumes

Now... Local Availability on

Titeflex

Seal-Tight, Time-Saving

Quick-Seal Couplings

Titeflex Couplings are *leakproof* at *all* operating pressures—the higher the pressure the tighter the seal! Couple or uncouple in ONE second... without the aid of tools. Straight-through or single or double check-valve types. Allow free flow of *any* viscous material. Sizes from ¼" to 12" diameter. Made from a variety of metals and alloys to suit innumerable industrial applications.

Titeflex

Flexible Metal Hose

—the ideal "conveying mate" for Titeflex Couplings. Withstands high temperature and pressure stresses. Impervious to vibration and corrosive action.

Both these time-tested products are available for immediate shipment from distributors' stocks in most areas. Otherwise write, wire or telephone direct.

CALL YOUR LOCAL DISTRIBUTOR

Consult the yellow pages of your telephone directory

Your one source for both Hose and Couplings

Titeflex

TITEFLEX, INC., 536 HENDEE STREET, SPRINGFIELD 4, MASS.

For more facts circle 601 on Reply Card

Snap-on Torqometer® being used to equalize tension to 35 foot-pounds torque on all nuts used on this Reliance boiler gauge.

Assembly speed . . . Final check Reliance Gauge gets both from Snap-on Tools

Building water level alarms and indicators requires an extra measure of care and precise quality control — people depend on these instruments. That's why Reliance Gauge Column Co., Cleveland, Ohio, takes every caution in the manufacture of its gauges — and why this company depends on *Snap-on* tools for proper gauge assembly and for final bolt tension checking.

Joseph A. Kyr, Reliance plant superintendent, states, "*Snap-on* ratchet wrenches and sockets are used by all departments for the sub-assembly of all Reliance flat glass gauges. In the final assembly, *Snap-on* Torqometers® are used to get even tension distribution on all studs. We find we can depend on these Torqometers® to give us the exact bolt tensions we specify."

The company also recommends to all of its customers the use of a Torqometer® for servicing water gauges.

Got a tool problem? Call the Snap-on man.

If you have a production or maintenance problem involving special tool design or application, or any other question on tools, talk it over with your *Snap-on* man. He's a specialist who devotes all of his time to industrial application of *Snap-on* tools. Write us or call your nearest branch. Free catalog of industrial wrenches and hand tools is yours for the asking.

*Snap-on is the trademark of Snap-on Tools Corporation.

SNAP-ON TOOLS CORPORATION

8068-L 28th Avenue • Kenosha, Wisconsin

For more facts circle 602 on Reply Card

NEW PRODUCTS

(Begins on page 144)

quietly and economically, the Torrivent has a louver fin discharge grille adjustable for air discharge patterns. Capacities range from 1150 to 36,000 cfm of air delivery and from 50,000 to 1,900,000 Btu. Other features include a fan for operation at extremely low noise level; compact casing, keeping height and width of units at a minimum; and removable panels. Typical process uses of these units include curing drying, fog removal, exhaust of contaminated air and moisture control. The Trane Co.

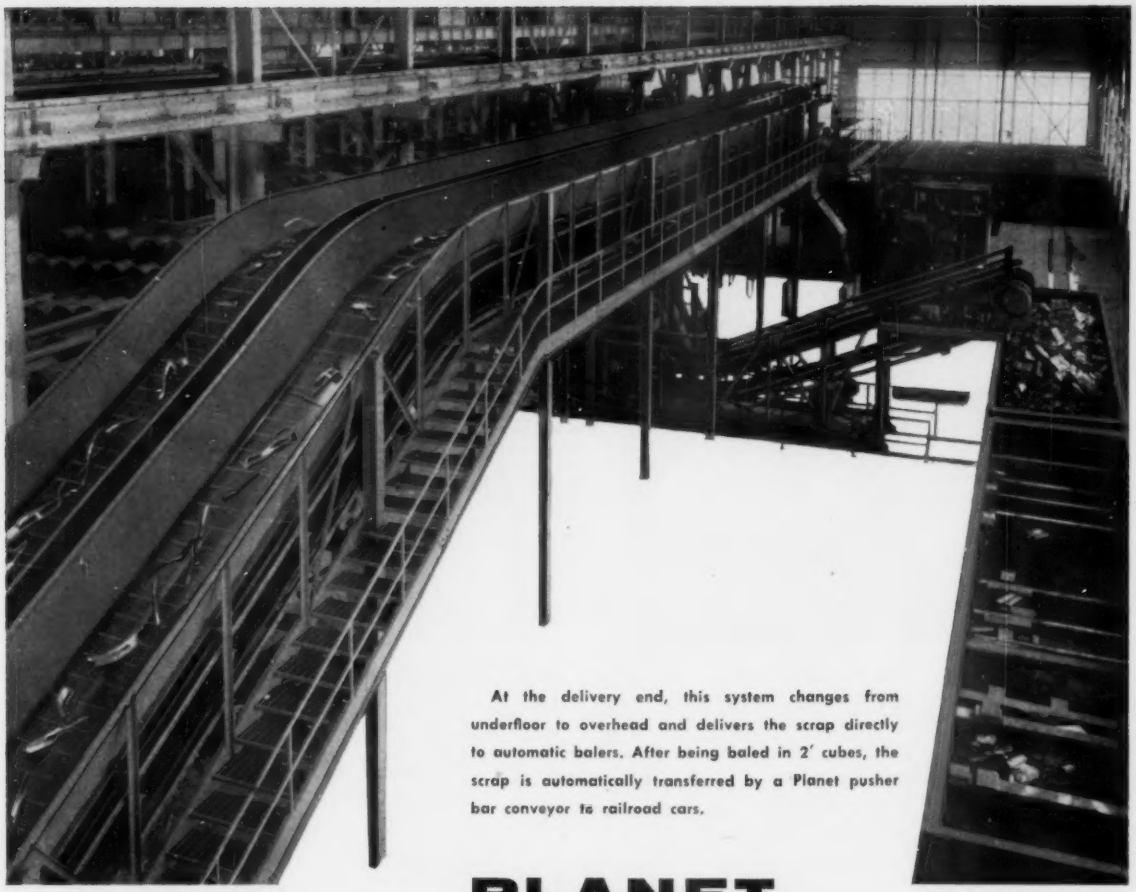
34—GRAVITY WHEEL RACK for different sized items

For applications requiring easy and frequent change of package size, the Slide-Adjust Versarack is a gravity wheel storage rack providing first-in first-out storage of packages and flat-bottomed items. It consists basically of inclined wheels

mounted in a steel frame. The frame is adjustable to permit easy changes of pitch and vertical spacing of the rails. The latter are rigid steel members retained in the frame so as to slide laterally for changes in spacing. This rack utilizes two rails under each row of packages and operates without a divider. Each rail has a package stop at the front. It is noted that the heavy duty construction of the rack permits widths up to 10 ft without intermediate column supports, making it a space saver. A wide range of heights, depths and widths are available. Rails and frame are of rolled steel, zinc coated. The M-H Standard Corp.

35—WIRE CONNECTOR makes solderless splices

Scotchlok Type R Connector is reported to make solderless, ready-insulated splices in one step without tools, providing a vibration-resisting pigtail splice that holds regardless of thermal or mechanical changes. Manufacturer says this connector is approved by Underwriters' Laboratories for high and low voltage building (1000 v maximum) and fixture (600 v maximum) wiring. It consists of a cone-shaped coil spring within a steel shell to prevent crushing in crowded junction boxes. The vinyl insulating



At the delivery end, this system changes from underfloor to overhead and delivers the scrap directly to automatic balers. After being baled in 2' cubes, the scrap is automatically transferred by a Planet pusher bar conveyor to railroad cars.

PLANET
ENGINEERED SYSTEM
automatically handles 20 tons of scrap per hour

This Planet apron conveyor, moving through a tunnel under trim presses, automatically delivers to the balers up to 20 tons of loose scrap per hour. A simple clutch-operated auxiliary drive assures continuity of operation.

For a leading automobile plant, Planet recently engineered and installed a 1200 foot system to handle the scrap from trim presses having a combined capacity of over 4000 tons. Because the entire operation is automatic, this scrap handling system saves time and money . . . and baled scrap is worth more, too.

It paid this manufacturer to use Planet's engineering know-how. If you have a scrap handling problem it will pay you to write or phone today and "PLAN WITH PLANET"

PLANET CORPORATION

1840 SUNSET AVE., LANSING, MICH.

- ENGINEERED HANDLING SYSTEMS
- AUTOMATED EQUIPMENT
- FOUNDRY HANDLING SYSTEMS

65

For more facts circle 603 on Reply Card

What d'ya mean . . .
You're too little to use RANSBURG Electrostatic Spray Painting?
If your production justifies conveyorized painting, chances are RANSBURG NO. 2 PROCESS can do YOUR painting job better . . . at less cost.

RANSBURG NO. 2 PROCESS *accounts for a 50% savings in paint costs in finishing fluorescent lighting fixture parts for* MELROSE LIGHTING COMPANY, *Philadelphia. Melrose is a small plant employing only 25 people.*

Not only big industrial manufacturers like G. E. . . . Whirlpool-Seeger . . . Westinghouse and Republic Steel, but little plants, too, are using RANSBURG NO. 2 PROCESS in their finishing departments to help keep mounting manufacturing costs in line.

A typical example is Melrose Lighting Company, Philadelphia. They make industrial fluorescent lighting fixtures and employ only 25 people.

Formerly, according to F. Homer Hagaman, owner Melrose Lighting, when their fixture louvres were hand sprayed, they painted only 70 pieces per hour. Now, with Ransburg Electro-Spray, he reports they get over 200 per hour.

Production on the fixture end parts jumped from 400 pieces per hour by hand spray to over 2000 an hour electrostatically—a 400% increase!

Along with improving quality of the work, stepping up production, and cutting labor costs, Melrose is enjoying a 50% paint savings.

Let us show you how Ransburg No. 2 Process can lower YOUR painting costs. Write for our new No. 2 Process brochure on electrostatic spray painting. Numerous production-line examples show how other manufacturers are cutting finishing costs . . . increasing production . . . and improving the uniformity and quality of their work with Ransburg equipment.

Ransburg ELECTRO-COATING CORP.
Indianapolis 7, Indiana
RANSBURG

For more facts circle 604 on Reply Card

NEW PRODUCTS

(Begins on page 144)

jacket—molded over the unit—features a triangular cross-section for a better finger grip. It also includes a skirt at the bottom to prevent flashover.

In use, the connector is simply screwed on the ends of the wires to be spliced—the cone-shaped spring construction providing threads and gripping the wires under tension. The pre-insulated connector is reported suitable for use on wire sizes from No. 10 to No. 16 AWG in 64 possible combinations. Minnesota Mining and Mfg Co.

36—HAND LAMP, portable, for flammable atmospheres

For safe, yet practical lighting in flammable atmospheres, such as in the interiors of fuel tanks during cleaning or painting, the Type EVH70 Hand Lamp is announced. Weighing less than 11 lb, this fixture uses 150-w PAR-38 reflector type spot and flood lamps which produce

a concentrated light pattern. Manufacturer says the explosion-proof lamp is UL-approved for Class I, Group C locations (atmospheres laden with flammable mixtures of ethyl-ether vapors, ethylene, or cyclo-propane) or Group D locations (those containing hazardous quantities of gasoline, hexane, naphtha, benzine, butane, propane, alcohol, acetone, benzol lacquer solvent vapors, or natural gas.)

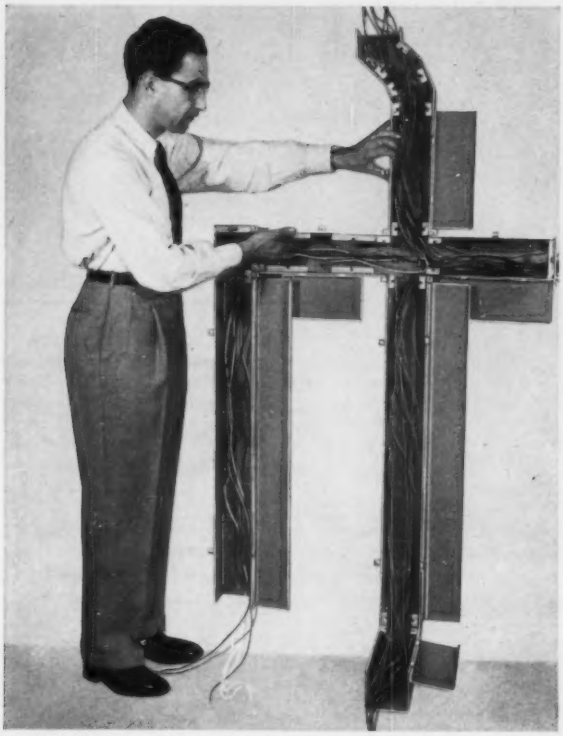
The fixture's cone-shaped aluminum body is ridged with heat-dissipating fins, and its plastic coated fiber handle is said to remain cool to the touch even after the lamp has been in use. Crouse-Hinds Co.

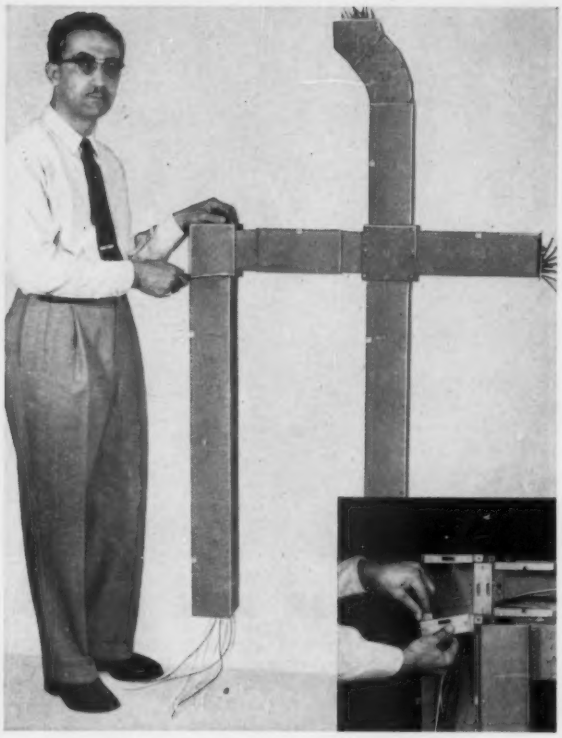
37—FIELD COIL with improved insulation system

An "integrated" field coil with a newly developed insulating system designed to protect electric motors and generators against atmospheric contaminants and destructive mechanical forces is announced. This field coil construction is reported particularly well suited for applications requiring chemical resistance, oil- and moisture-proofness, or sealing against atmospheric contaminants such as carbon black, dust and dirt. It is currently available for synchronous and

Make turns, angles, bends, tap-offs with General Electric's

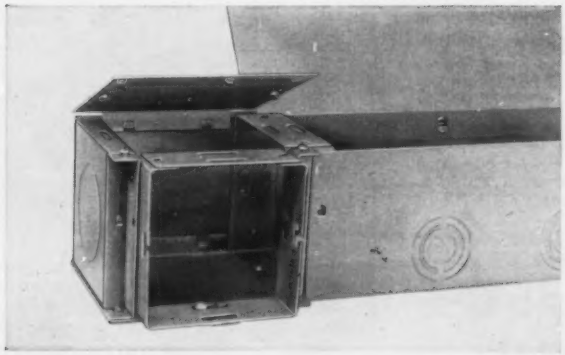
New 11-part, hinged cover, lay-in Wireway





1. Lay in wiring and use only 11 different parts. With only 11 different parts (half the number usually required), you can make the bends, angles, joints and tap-offs called for in complex electrical layouts—**because every fitting can do at least four different jobs.** And yet, every part, every fitting, no matter what the direction, opens up for **complete** lay-in wiring, including the telescopic length.

2. Hinged cover and hook-and-slot fittings cut assembly costs. Simple two-piece connectors are snapped into place (see inset above), fitting cover plates are screwed on and full-length covers of straight sections are swung and snapped closed—to complete in less time than ever before possible the estimating, ordering, and installation of a complete wireway system.



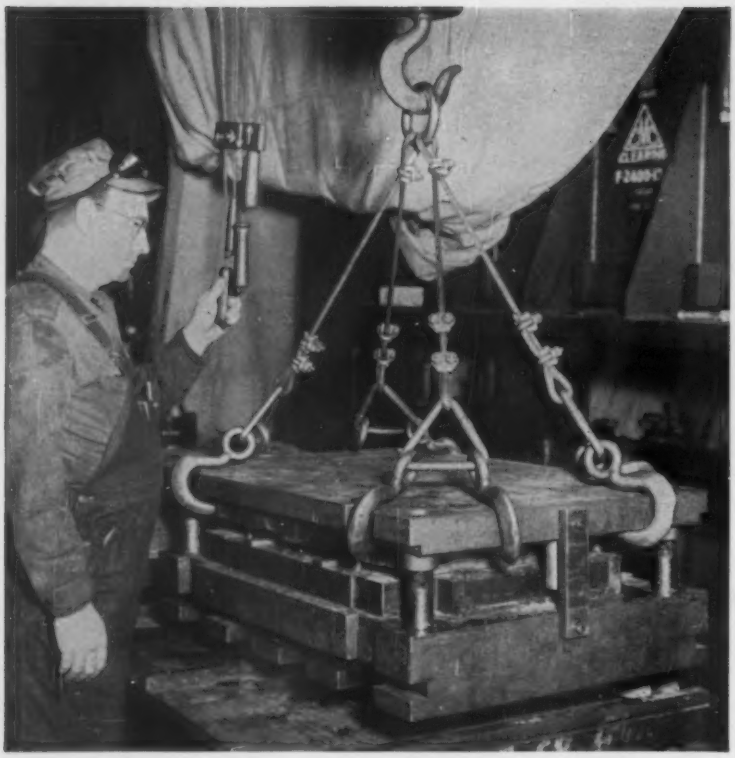
3. Each fitting does at least 4 jobs. Every fitting goes right, left, up and down, cutting the number of "special" fittings needed. When the end plate is removed from the 90° elbow (shown at left joined to straight section), it can also be used as 4-direction tee fitting—a total of 8 fittings in 1!

The simple, flexible design of the new Type HW Wireway has made possible a new, low price. Three sizes are stocked—4 by 4 inches, 6 by 6 inches and 8 by 8 inches. For more data, see your G-E Distributor or Sales Representative. Or write for Bulletin GEC-1426 to **General Electric Company, Distribution Assemblies Dept., Plainville, Conn.**

Progress Is Our Most Important Product

GENERAL ELECTRIC

For more facts circle 605 on Reply Card



RIGGED FOR SAFE DIE HANDLING

To handle heavy, expensive die sets with complete safety, this manufacturer uses eight Laughlin Eye Hoist Hooks—two on each corner. The wire rope is positively secured with genuine Crosby* Clips and Laughlin Thimbles protect the rope at the lifting points.

LAUGHLIN HOOKS—drop forged and heat treated—take the risk out of this job. They're precision designed and manufactured from special high quality steel—construction that results in maximum strength and uniformity without excessive weight. Hooks are available to fit rope up to 1½" with capacities up to 20 tons!

TOUGH LAUGHLIN THIMBLES, manufactured from hot rolled steel bars, resist crushing forces. They're offered in sizes to fit all ropes from ⅛" to 2¼"!

GENUINE CROSBY CLIPS provide maximum holding power for wire rope from ⅛" to 3" in diameter. In every application where the safety of men or materials must depend upon wire rope rigging, safety engineers specify Crosby Clips! Look for the "Red U-Bolt"*—you'll see it in use everywhere—in every industry!

THE STRONGEST LINK

Wherever a chain link is replaced or connections made, a potential safety hazard exists—unless genuine Laughlin "Missing Links"* are used to do the job! This easily installed split link is essential whenever maximum safety is required. It's as strong as BBB chain! Drop forged "Missing Links" are matched to a perfect fit under tons of pressure. Your Crosby-Laughlin Distributor carries a complete range of sizes from 3/16" to 1 7/8"! Insist on the *genuine* "Missing Link".

*REGISTERED TRADEMARK

Stocked and sold by leading distributors everywhere

CROSBY-LAUGHLIN *Division*

American Hoist and Derrick Company

FORT WAYNE 1, INDIANA

For more facts circle 606 on Reply Card

NEW PRODUCTS

(Begins on page 144)

d-c machines subject to severe duty cycling in Class A and B temperature classifications. Studies indicate that the system will eventually be available for Class H temperature applications.

Primary insulation in the "integrated" field coil construction is glass with fibers tailored and oriented for strength. Solventless types of inorganic, heat stable resins augment the glass fibers. According to company, these resins bond so well with coil conductors and pole surfaces that the structure is fused together into one integral part—and the enveloping skin inseparably locked with the coil and pressure molded to coil contours. Full details are given in Leaflet 05R8525. Allis-Chalmers Mfg. Co.

One of these products may be "just what you're looking for." Use the handy Reader Service Cards to ask for more information on it.

38—COATING looks and acts like porcelain

Duracron is reported to look and perform more like porcelain than any other known organic finish. This family of enamel coatings is based on a series of thermosetting acrylic resins which comprise a new chemical composition, according to manufacturer, and is a radical departure from baking enamels now in use. Company says that its outstanding toughness, mar resistance and durability make it suited to almost any application where a superior baking enamel is desirable. The product is also said to possess exceptional adhesion to various metal surfaces and primers. It will be furnished in a full range of colors. According to manufacturer, Duracron will cost slightly more per gallon than many baking enamels, but this cost will be lower for many applications since only a single coat will be needed. Pittsburgh Plate Glass Co.

39—SYNTHETIC LUBRICANT minimizes fire hazard

Pydraul AC is announced as a synthetic lubricant for air compressors which minimizes explosions and receiver fires as well as carbon deposits on exhaust valves and air system piping. According to manufacturer, Pydraul AC is a fire-resistant fluid equivalent in lubricity to a premium grade lube oil. Similar in properties to company's other Pydraul fire-resistant fluids, it is reportedly unique in ability to reduce carbon deposition, offering maintenance savings in addition to a wide safety margin in compressed air systems. Conversion of compressors from petroleum lubricants to Pydraul is declared simple. Splash-lubricated compressors need only be cleaned of their petroleum

For more facts circle 607 on Reply Card →

16,700 pounds of fork lift and steel wire roll smoothly over this Multigrip protected aisle. In the past, the 2-inch-thick wooden flooring required repairs two or three times a week. In the eight years Multigrip has been on the job, there hasn't been a single hole or worn spot.

Perfect traction allows this heavily-laden fork lift to roll easily from a concrete ramp onto the Multigrip Floor Plate aisle. Even after eight years, the floor plate has shown hardly a sign of wear.

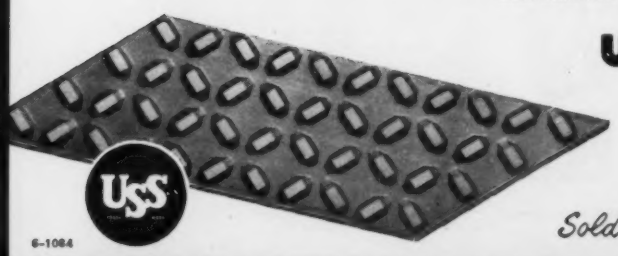
Multigrip Floor Plate solved a tough maintenance problem

How much does it cost to repair wooden flooring two or three times weekly? "Too much," said a Midwestern metal fabricating company. Fork lifts in their plant, loaded with steel wire for a grand total of 16,700 pounds, were breaking through 2-inch-thick wooden flooring regularly.

Eight years ago, 12,000 square feet of USS Multigrip Floor Plate were used to surface all aisles and ramps used by the heavily-laden trucks. To date, maintenance has been limited to replacement of a few bolts used to fasten the Multigrip to wooden flooring beneath. Installation took only a few working days, including measuring, cutting turns, laying and seam-welding. The Maintenance Supervisor says, "Since I installed Multigrip Floor Plate, I haven't had to patch a hole and haven't had to reweld seams, smooth off risers or anything. There isn't a thing except steel floor plate that could carry lift-loads of 16,700 pounds without damage."

Multigrip Floor Plate can be a plus factor on your maintenance budget, too. These tough steel plates with their flat-topped risers stay in service for years with hardly a sign of wear. They provide "safe-tread" traction for both feet and wheels, even when wet. Since oil and grease can't possibly soak in, a broom is all that's needed for cleaning. Multigrip is available in large plates for economical installation and may be bent or formed where necessary. Make your plant safer while giving your budget a break by protecting ramps, stairs, aisles, platforms and floor areas with USS Multigrip Floor Plate.

UNITED STATES STEEL CORPORATION, PITTSBURGH • COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO
TENNESSEE COAL & IRON DIVISION, FAIRFIELD, ALA. • UNITED STATES STEEL SUPPLY DIVISION, CHICAGO
UNITED STATES STEEL EXPORT COMPANY, NEW YORK



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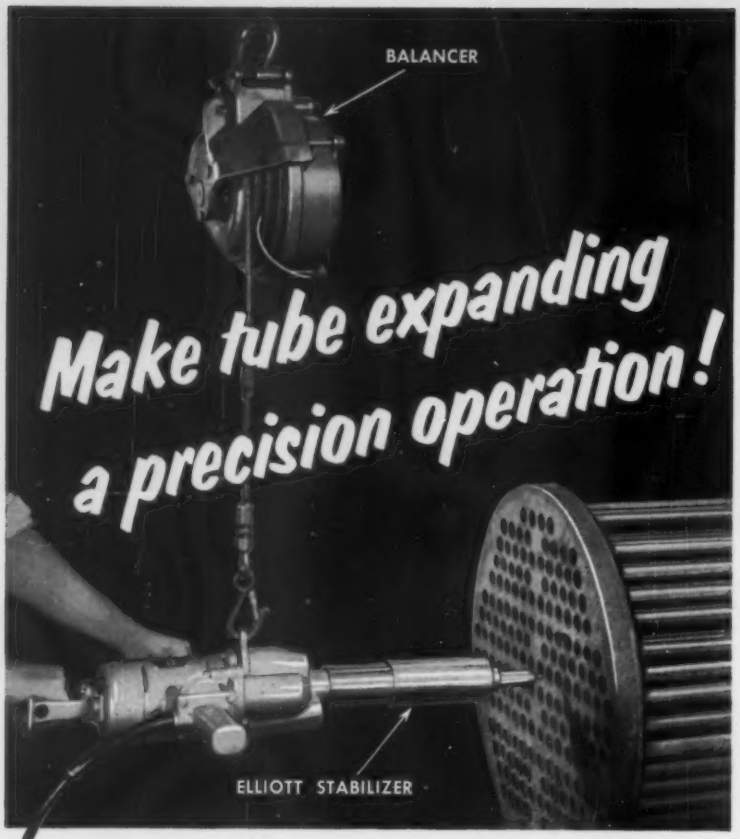
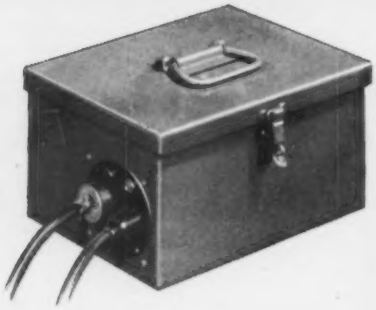
USS multigrip FLOOR PLATE

Sold by leading distributors from coast to coast

UNITED STATES STEEL



THE ELLIOTT ELECTRICAL CONTROL



Get tight, uniform tube joints everytime and get them fast. The Elliott Electric Control, a torque-limiting device designed for use with any standard tapping motor, automatically balances outside voltage variables (without the need of a separate voltage regulator), controls the torque, and tells you when the tube has been rolled tight.

Speed the operation too with balancer and the Elliott Stabilizer which takes the wobble out of tube rolling. It centers and holds the expander case and cage, allowing operator to keep both hands on the motor. Full details in Bulletin Y-40. Address Elliott Company, Lagonda Division, Springfield, Ohio.

ELLIOTT Company

YB-6

STEAM TURBINES • MOTORS • GENERATORS • DEAERATING HEATERS • EJECTORS • CONDENSERS • CENTRIFUGAL COMPRESSORS • TURBOCHARGERS • TUBE CLEANERS • STRAINERS

For more facts circle 608 on Reply Card

NEW PRODUCTS

(Begins on page 144)

deposits before installing the new fluid, it is noted; separate force-feed cylinder lubricators can be converted with modification kits. Monsanto Chemical Co.

40—DEMOUNTABLE LIFT uses vertical monorail

This elevator is claimed to be the first demountable, approved passenger elevator, and to take the place of a permanent elevator installation heretofore required in many states during construction, maintenance and repair work. Manufacturer says its safety features meet, or surpass codes and ASA specifications. The elevator operates on a vertical monorail and

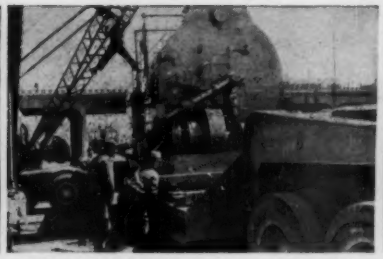
has a 2000 lb capacity. It is reported simple to set up and operate; it can be disassembled, moved and re-erected.

The new elevator is designed to fill the need between a permanent elevator installation with enclosed shaftway, multiple guide rails, top cupola and permanent wiring, and temporary facilities which may lack the height, capacity, speed and safety to service temporary but extended projects. With the addition of a stabilizer bracket about every 15 ft, it is claimed practical for almost every industrial use and height. A double-grooved pulley on top of the monorail column carries the two steel hoisting cables as they lift the car. A cable equalizer maintains tension on the hoisting cables and trips a safety locking device should either cable stretch abnormally or break, and a safety lock is provided. Hawkeye Products Corp.

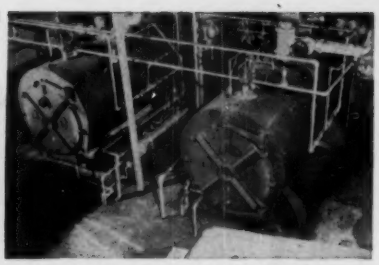
41—METAL STRAPS snap on pipe and conduit

It is claimed that this strap permits neater, faster installations because it doesn't have to be held in place, and is particularly good for overhead or hard-to-reach jobs because it can't drop off. According to the manufacturer, further savings can be made by using these straps and spot welding for installation to steel frame work. Secret of the "snap" is a bump inside the strap. As the strap is pressed on, the bump causes a slight springing action which holds the strap in place. Ribbed construction adds to the

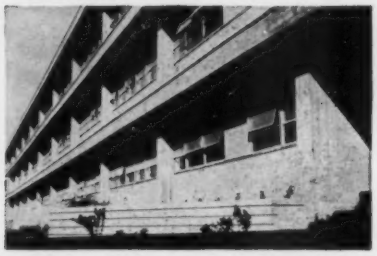
300 hp Cyclotherm with 1 to 6 modulation operates with no loss of efficiency at *Lorain Towel Supply* Co.



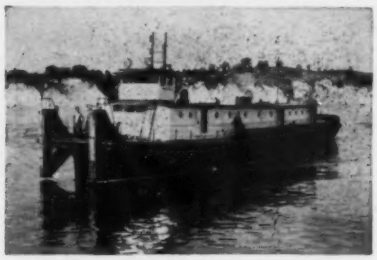
New, 750 hp Cyclotherm is most powerful package boiler ever developed. Delivers 26,000 pounds of steam per hour to a Denver linen supply company.



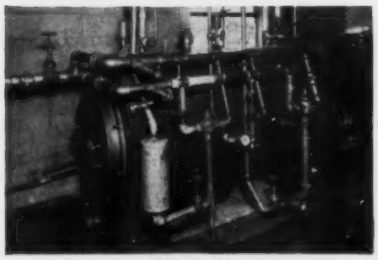
Annual savings of over $18,000 in labor, fuel and insurance costs, by installing two 125 hp Cyclotherms at *Howard Arthur Manufacturing Co.*



Reverse Boiler Water Flow on two, 60 hp Cyclotherm step up heating efficiency at *San Diego Education Center.*



Shipboard boiler room was too small for a conventional boiler, but Cyclotherm fit with room to spare in the *Sinclair Chicago.*



One Cyclotherm delivers three temperatures of water — 90°, 125° and 185° — simultaneously with no storage tank. No attendant needed.

Six different problems with one answer...

CYCLOTHERM

When you have a problem in steam or hot water generating, chances are Cyclotherm will be *your* answer, too. These are but a few of the hundreds of applications where Cyclotherm has outshown other boilers in economy, space and performance. Operating on the patented Cyclonic Combustion principle, Cyclotherm gives intense, but controlled heat through the length of the furnace. Hot spots and heat-retarding scale are eliminated by distributing the flame evenly, without impingement. In up to ⅔ the space required by an ordinary boiler, you can install a Cyclotherm. Its simple, streamlined construction saves up to 50% of maintenance costs, and delivers a guaranteed minimum of 80% efficiency in only 2 passes.

The Cyclotherm Steam or Hot Water Generator is delivered complete, ready to go with five simple connections. No additional insulation or instrumentation is needed, and you supply only a simple flue—not a costly stack. Cyclotherm models range from 18 to 750 hp, from 15 to 200 psi. Larger units regulate firing ratio from 30% to 100% of rating without losing efficiency. All models are factory tested, and are warranted free of all defects in workmanship or materials for one year. *For an 8-page booklet describing over 30 different Cyclotherm installations, write today to Dept. 3142*

YEARS AHEAD IN STEAM GENERATION CYCLOTHERM STEAM AND HOT WATER GENERATORS

CYCLOTHERM DIVISION National-U.S. Radiator Corp., Oswego, N. Y.

See the Cyclotherm Exhibit—13th International Heating & Air Conditioning Exposition Feb. 25—Mar. 1, 1957, Booth 551, International Amphitheatre, Chicago, Ill.

For more facts circle 609 on Reply Card

Now!
DYNAPRENE®
14/2 SO AND LARGER
Flexible Cord
is marked for
EASY SIZE
IDENTIFICATION

DYNAPRENE is now listed by the U.S. Bureau of Mines and the Pennsylvania Bureau of Mines. Identification number is P-118 BM. » » » DYNAPRENE is designed and manufactured to withstand rough operating conditions, and give long dependable service, cutting machine down time and maintenance costs. » » » In mines as in industrial plants, impact and flexing are prime causes of flexible cord failure. DYNAPRENE, the WHITNEY BLAKE neoprene jacketed cord, has proved through years of rough usage its superior resistance to these two harmful factors.

And, in addition, DYNAPRENE withstands the damaging effects of water, oil, grease, sunlight, solvents, heat, ozone and abrasion. » » » DYNAPRENE in sizes 14/2 SO and larger is marked every twelve feet with name and size, a convenience that will make it easier for users to select the right size for the right job at all times. Because the neoprene jacket is permanently marked with the name DYNAPRENE you can always be sure when you use it, that you have the best in flexible cord.

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WELL BUILT WIRES SINCE 1899

WHITNEY BLAKE CO.

NEW HAVEN 14, CONNECTICUT

For more facts circle 610 on Reply Card

NEW PRODUCTS

(Begins on page 144)

snap and provides rigid support of conduit or pipe. Straps are made of steel, zinc plated after fabrication. They come in six sizes from ½ to 2 in. for thin-wall conduit, seven from ⅜ to 2 in. for rigid conduit and pipe. Holub Industries, Inc.

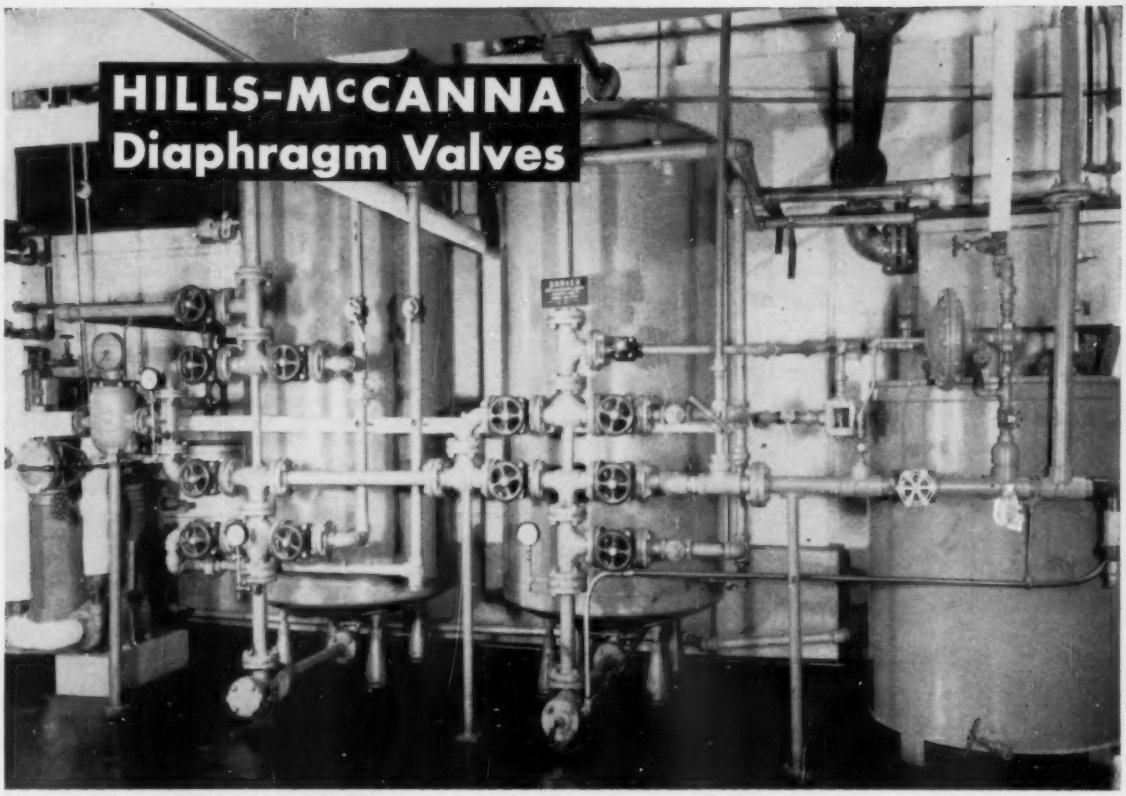
42—AIR VALVE works quietly in control applications

This is announced as an electrically-operated air valve that doesn't talk back, hum, or chatter. Its closely-held spring, armature, guide and material tolerances are designed to prevent alternating current hum and other noise frequently present in such controls. This electro-pneumatic valve is suggested for noiseless control of

air conditioning damper motors, as well as for control of pneumatic motors and valves on industrial equipment. When electrically energized, the valve will pass full air at supply pressures to 25 lb, manufacturer states; and when not energized will waste air from its outlet port and close the inlet. A built-in manual adjustment lets valve pass air when coil is not energized. The 60-cycle coil can be supplied for voltages of 115, 208, 230 or 440. Twelve-in. electrical leads come from a rotating housing to facilitate wiring. Additional information is in Bulletin 359. Powers Regulator Co.

43—PRESSURE BURNERS fire Scotch marine boilers

Syncro-Flame Pressure Burners are designed for economically firing Scotch marine type boilers and similar compact steam generators. It is noted that because of their ability to work against combustion chamber back pressures of 3 in. of water or more, these burners do not require a high stack or induced draft equipment. They are made in several sizes for boilers from 10 to 150-hp ratings, and come in three types: for gas firing, oil firing, or combination gas-oil firing (with manual or automatic changeover). Features announced include two-stage fire, and built-in controls for pre-purge, post-purge and high-low-off fire with automatic air/fuel ratio settings. The gas and combination burners also incorporate a



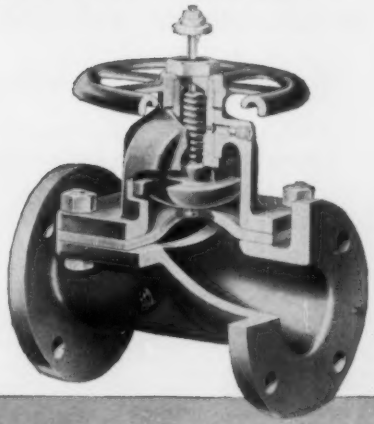
Meet All Five Critical Requirements of this Two-bed Demineralization System

Concentrated and dilute acids and corrosive liquids are handled effectively and dependably by Hills-McCanna Diaphragm Valves in this Graver ion exchange demineralizer. And the Hills-McCanna valves meet all five critical requirements of the system:

System Requirement	Hills-McCanna Solution
Corrosion Resistance	Plastic or plastic lined bodies* plus the patented Hills-McCanna diaphragm prevent contact between corrosive solution and metal parts of the valve.
Leaktight Closure	Hills-McCanna beaded diaphragm construction provides controlled, cushioned, "pinch-clamp" closure.
Minimum Head Loss	Streamlined flow passage of Hills-McCanna valves has no sharp changes of direction.
Easy Maintenance	No packing to take up or replace. Only maintenance required is occasional diaphragm replacement, accomplished without removing valve body from line.
Easy Adaptability to Automatic or Remote Operation	Hills-McCanna valves are used with virtually all types of operators.

Also available in a wide choice of other corrosion-resistant materials.

If you valve hard-to-handle fluids, your problems are probably similar to these. You, too, can solve them with Hills-McCanna Diaphragm Valves. For further information, write for Bulletin No. 100.



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ALL plant engineers and operating men should keep posted on progress by learning about the newest developments in heating, ventilating, cooling and air conditioning equipment. At Chicago, you will see thousands of new and improved products that may help to improve efficiency in your plant. Here you can talk over your problems with the technical representatives of more than 450 leading manufacturers. You owe it to yourself AND your employer to see what's new at the biggest industrial equipment exposition of its type in the world.

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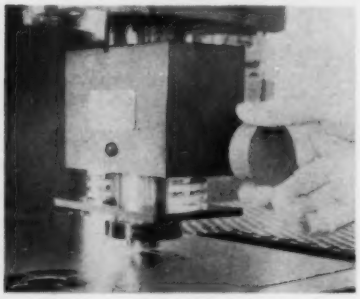
NEW PRODUCTS

(Begins on page 144)

new circuit said to virtually eliminate the possibility of an explosion, even under bad misadjustment conditions. Synchronous Flame, Inc.

44—HOLE FINDER for sheet metal punching jobs

The Lo-Ka-Tor, simplifies hole locating problems in sheet metal punching when quantities are small, such as prototype work, template making, or punching a few pieces from a template. Used in standard punch presses, it locates and punches holes without use of stops, gages, fingers, pins or locating tables. The one-hand control lowers (or raises) the punch to the workpiece, independent of the



press. This allows exact alignment of punch and hole location in workpiece before tripping the press, says manufacturer. When the press is tripped, the Lo-Ka-Tor automatically punches the hole, locks the punch for the upward stroke, and strips the workpiece. It is claimed that extreme accuracy can be achieved by using punches with male centers on the punch faces—the center can be engaged under manual control, before tripping the press, directly into counterpunch marks in the workpiece.

Having made a template in this way, repeat pieces can also be quickly made by clamping the template on top of each workpiece in turn, and lowering the punch manually into each template hole before tripping the press. Standard punches may be used with the Lo-Ka-Tor. The model now being manufactured is designed to fit any press with a stroke not over 3 in. having at least 6 in. of shut height. Buck Engineering Co., Inc.

45—LIQUID METERS offer larger capacity, longer life

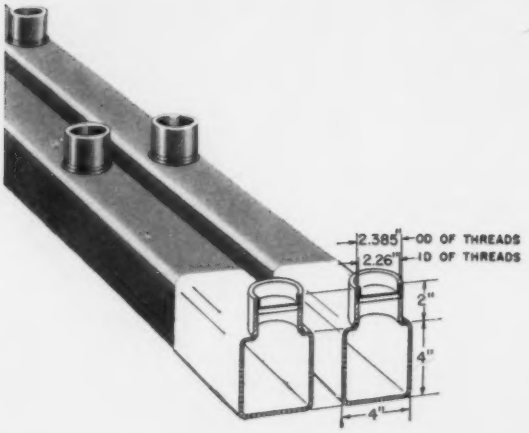
Utilizing the basic operating principle of company's standard Rotocycle Meters, these new models feature a crank-type linkage for gear control. Three models provide flow capacities from 400 to 1000 gpm. By means of a control plate and control arms in place of gear arrangements, this new linkage cuts down the number of parts, manufacturer explains; it makes for stronger control of vane positioning and therefore increases ca-

Eliminate overhead wiring hazards...

SPECIFY

JUMBODUCT

INDUSTRIAL UNDERFLOOR ELECTRICAL RACEWAYS



Versatile in design, National Electric Jumboduct offers plenty of capacity for production line wiring . . . eliminates the hazard of overhead wiring . . . permits flexible, attractive plant layouts by providing for readily accessible electrical distribution in the floor at a minimum cost.

A Jumboduct system in your plant means:

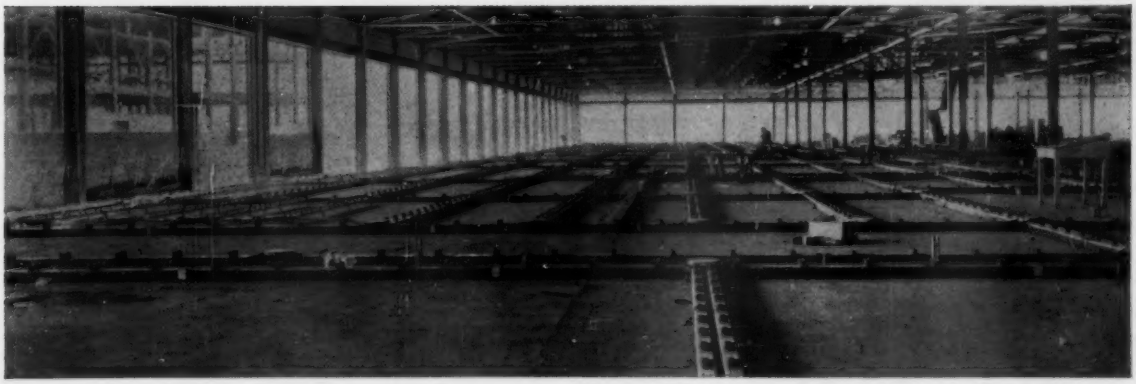
Plenty of capacity
4″ x 4″ Cross Section—more room for wires

Efficient power distribution
2″ pipe threaded outlets every 24″ permits exact location of equipment

Low Cost
- Easy-to-handle 10′ lengths
- Same simple installation procedure as standard Nepcoduct
- Quick access to inserts
- Investment in conductors limited to today's needs with ample space for tomorrow's additions

Safety
- Protected against corrosion by Sherardizing
- Coated with a baked-on acid-resisting enamel
- A completely grounded all-steel system

Get the details on JUMBODUCT today! Write for your free copy of the engineering Data Book on NE JUMBODUCT.



NATIONAL ELECTRIC PRODUCTS — WIRING SYSTEMS

National Electric Products

PITTSBURGH, PA.

3 Plants • 10 Warehouses • 36 Sales Offices

For more facts circle 613 on Reply Card

Ask these questions, too, when you judge a fluorescent lamp...

Is your investment protected?

Check Westinghouse Fluorescent Lamps against any other brands you are now using. Check them for maintained brightness, long life, uniform appearance. If you are not entirely satisfied on all counts, your full purchase price will be refunded.

How about quality control?

From raw materials to finished product, every Westinghouse fluorescent lamp is subjected to *480 inspections and tests* before approval for shipment.

Is it the correct type, size and color for the lighting job to be done?

In the Westinghouse fluorescent family of 290 different lamps—including Slimline and Rapid Start—there's a type and size precisely right for every office, plant and merchandising application. Colors include seven different shades of "white" alone.

For the full story on how to get more for your money in fluorescent light, contact your Westinghouse Lamp Representative.

WATCH WESTINGHOUSE

WHERE BIG THINGS ARE HAPPENING FOR YOU!

For more facts circle 614 on Reply Card

NEW PRODUCTS

(Begins on page 144)

pacity and life expectancy. Also, simplicity of measuring element parts is reported to make these meters easier to keep in proper timing. The new crank-type rotors are interchangeable with rotors of Rotocycle meters already in use. Bulletin OG-411 provides details. Meter and Valve Div., Rockwell Mfg. Co.

46—LIQUID DETERGENT for general purpose use

Liqui-Det is described as a concentrated liquid detergent containing no soap. It is said to go into solution instantly and to develop copious suds, in hard or soft water, hot or cold, and then to penetrate and loosen common soils in a short time. Furthermore, says company, Liqui-Det can be used repeatedly without rinsing, and without causing build-up of film or discoloration. It is claimed safe on all surfaces and pleasant to the hands. Concentrations as low as ¼ oz to a gallon of water are reported effective. Oakite Products, Inc.

47—WIREWAY offers some installation advantages

Completely open, the Type HW Wireway has a hinged cover which opens the entire length of the run to allow "lay-in" wiring through every length and fitting. There's no threading of conductor through collars, it is pointed out. This wireway comes in 1- to 5-ft lengths, and in 4-by-4, 6-by-6 and 8-by-8 ft sizes. Standardized fittings are available, allowing the wireway to be tailored to contours of virtually any building. Designed for easy and quick installation, Type HW Wireway has a hook-and-slot arrangement to permit fast assembly of sections and fittings. Hanging is declared simple, and to meet changing load requirements, additional conductors can be laid in or existing wiring altered without extensive work. General Electric Co.

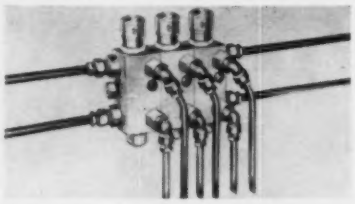
More information on any of these products can be yours without cost or obligation. Just circle the item numbers on the Reader Service Cards provided on pages 195-196.

48—PRECISION CLEANER for steam, compressed air

According to manufacturer, this cleaner separates moisture and entrainments until the steam or compressed air is as close to 100 per cent dry and clean as testing methods can evaluate. A multi-stage device, it includes many stainless steel separating units in series. The cleaner removes all line scale, mineral scale, rust, oil, dirt and liquid slugs, it is claimed. It is suggested for use with high pressure boilers, exhaust steam used in process work to feedwater heaters, beyond aftercooler in compressed air systems, steam for evaporators. Three standard types are available for line diameters to 12 in. Bradshaw & Co.

49—LUBE CYCLE COUNTER helps protect bearings

This lubrication-recording cycle counter, when used with company's Type II Accumatic centralized systems of lubrication, registers number of times that the lubricant valve is discharged, revealing at a glance that the lube system is functioning at predetermined



intervals selected to meet specific requirements. The unit, furnished as a kit, can be installed without removing the Accumatic valves from the system. It provides a permanent operational record of each valve. This compact unit merely screws into the valve and extends but 1⅝ in. above it when in operation. The counter face swivels to any position for easy reading. Piston action of the Accumatic valve actuates the counter mechanism at each lubrication cycle. The unit automatically resets to zero when counter reaches 99. Totally enclosed, the counter is reported to operate in a wide range of temperatures. Alemite Div., Stewart-Warner Corp.

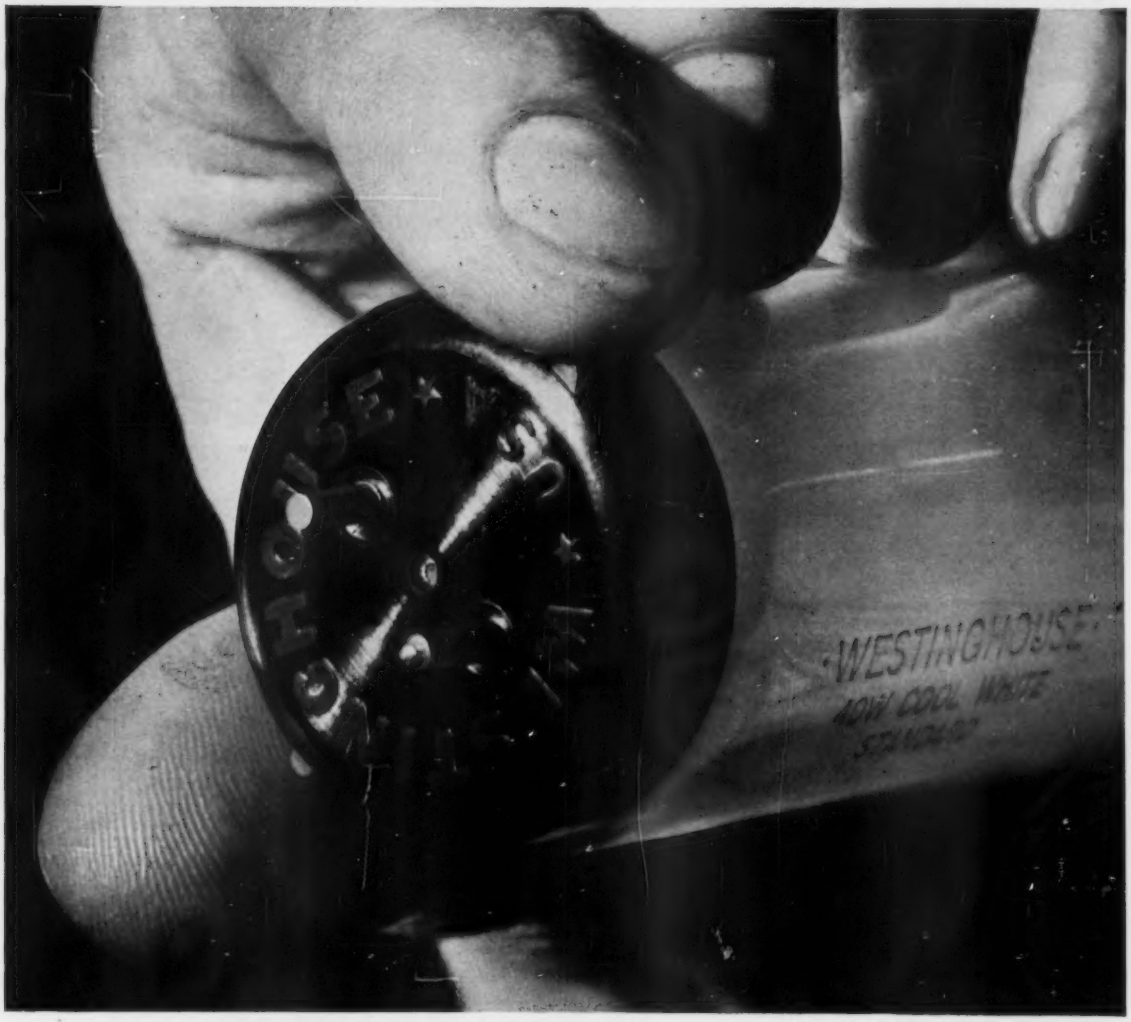
50—MAGNETIC DRIVE with "cross flow" ventilation

This magnetic drive, the Type MDS, replaces two of company's existing lines (Type MDC and MDE). A single basic design is used for all sizes and ratings from 200 hp at 720 rpm to over 2500 hp at higher speeds. A new concept in air cooling utilized and mechanical design changes account for significant savings in space required, compared to previous designs. Length of a 550-hp, 1200-rpm drive, for example, has been cut from 72½ to 48½ in.

Major components of the drive are: a ring member, coupled or belted to a driving motor; and a magnet member, similar to the rotor of a synchronous motor, connected to the load. Magnetic reaction between the two rotors, hence speed of magnet members, is controlled by amount of d-c fed to field poles from a magnetic amplifier control. Speed change is accomplished by turning a control potentiometer, manually or automatically.

Ring member of this drive is a simple, eddy current ring, grooved for maximum heat dissipation. "Cross flow ventilation" takes its name from the fact that cooling

how to judge a fluorescent lamp . . . point no. **10**



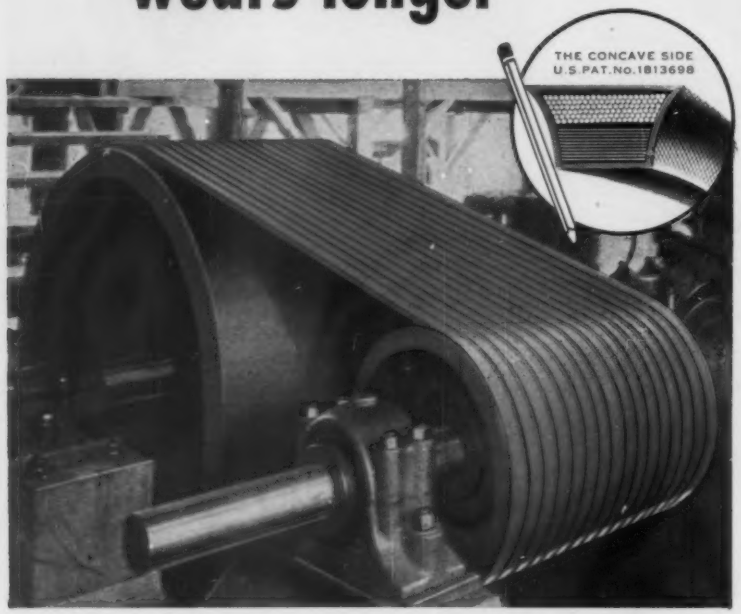
ask about SECURE SEATING

Secure seating of a fluorescent lamp means secure positioning of the lamp in its fixture. It's especially important in factory applications, where normal vibration can cause improperly seated lamps to drop out. Westinghouse solves the seating problem two ways. *First*, by means of "guide bumps" on the end-caps (above). *Second*, with uniform, accurate lamp length. The guide bumps are easily felt with the fingers, easily seen; a touch or a glance during lamp installation tells when the lamp is secure in its sockets. Accurate length assures that every lamp will exactly fit its fixture. Result: secure seating for every lamp, with "drop outs" virtually eliminated.

WATCH WESTINGHOUSE
*WHERE **BIG** THINGS ARE HAPPENING FOR **YOU!***

For more facts circle 615 on Reply Card

Why a V-Belt with CONCAVE SIDES wears longer



It is easy to demonstrate to yourself why the concave sides (Fig. 1) of the Gates belt greatly lengthen belt life.

Simply bend a Gates belt and feel the sides. Notice how these precisely engineered concave sides *fill out* on the bend and *become straight*. Thus a Gates belt grips the sheave groove evenly (Fig. 1-A) and wear is distributed uniformly across each side of the belt. That means longer belt life; lower costs.

Make the same test with a straight-sided belt (Fig. 2) and see what happens. The sides bulge out on the bend (Fig. 2-A) concentrating the wear at points shown by arrows.

To assure longer wear and keep belt costs down, specify the V-belt with Concave sides—Gates Vulco Rope . . . readily available from nearby distributor stocks. The Gates Rubber Company, Denver, Colorado—*World's Largest Maker of V-Belts.*

There are Gates Engineering Offices and Distributor Stocks in all industrial centers of the United States and Canada, and in 70 other countries throughout the world.

TPA 90

Gates VULCO ROPE Drives

For more facts circle 616 on Reply Card

NEW PRODUCTS

(Begins on page 144)

air is drawn axially past the rapidly turning ring and is forced down into the grooves. Air turbulence created by peripheral speed of the ring gives a high rate of heat transfer. Fresh air is also forced past the windings of the magnet member. Magnetic drives are used to control speed of boiler draft fans, centrifugal pumps, test stand equipment. Several units of the new drive are designed to control speed of 2500-hp boiler feed pumps. Publication 4400-PRD-232 gives data. Electric Machinery Mfg. Co.

51—15-IN. DRILL PRESS is rugged, adaptable unit

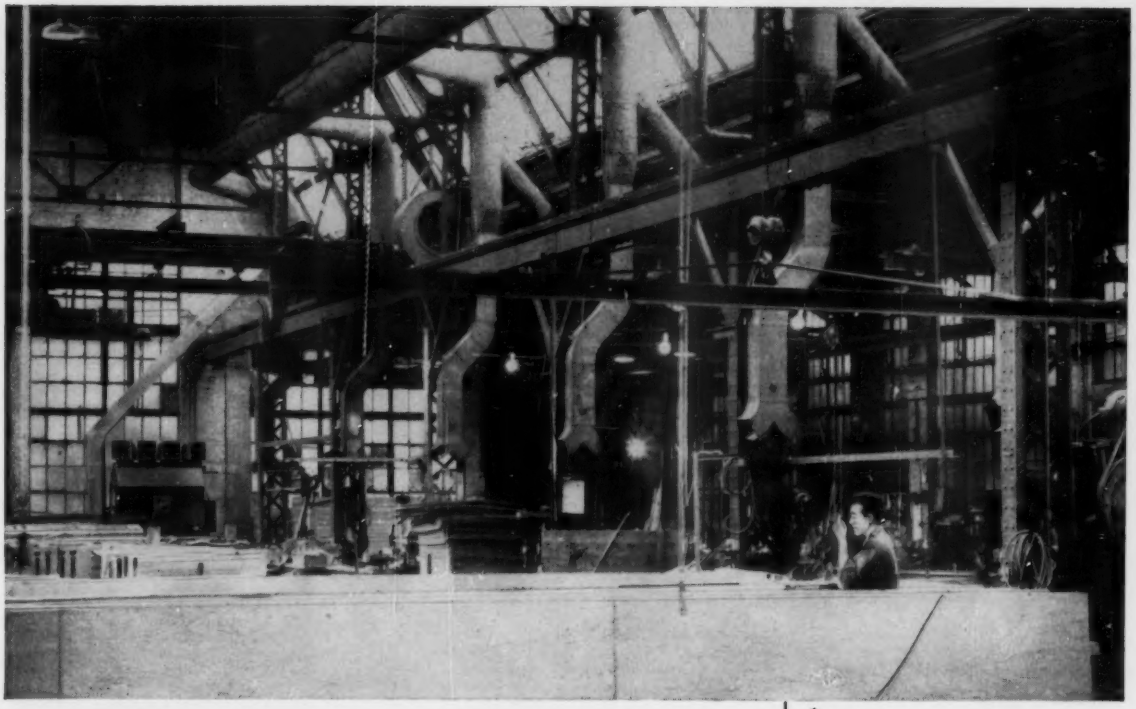
First of its size in company's Delta line, this 15-in drill press is available in a wide range of models and designed to provide all the ruggedness of heavier presses. Primarily a production-line tool for wood and metal-working, this machine is versatile enough and priced

low enough (less than $150, prices depending on model) to make it suitable for smaller shops. Also, components of the press may be obtained for making up special purpose equipment.

The machine's six separate spindle adapters feature taper mounting for accuracy and are locked on the spindle with a threaded collar. With these adapters the machine can perform dozens of specialized tasks in addition to drilling holes (½ in. in iron, ⅜ in. in steel). Operations with adapters include counterboring, tapping, surface grinding, routing, mortising, plug cutting and wood shaping. Slow and high speed models offer a range of 470 to 4600 rpm. An improved multi-speed attachment permits even wider ranges. The drill press is powered by a 1/3-or 1/2-hp motor. Rockwell Mfg. Co.

52—NOZZLE gives operator full control of air flow

Complete air flow control—from a slight puff to a full blast and without jumps from low to high or high to low—is reported possible with this controlled air nozzle. Fabricated of a heat-treated aluminum alloy, it has only two working



Richards-Wilcox more than doubles heating capacity

...cuts heat operating costs in half!

Plant heating problems first began for the Richards-Wilcox Manufacturing Co. of Aurora, Illinois, during World War II. Then, the existing steam plant, operating at full capacity, could not meet the heat requirements for new production areas. Immediate solution was the addition of two warm air space heaters.

Later, a 750,000 btu Dravo *Counterflo* heater was installed to serve additional expansion. But in 1951, facing even more expansion, Richards-Wilcox plant men thoroughly surveyed their total plant heating problem.

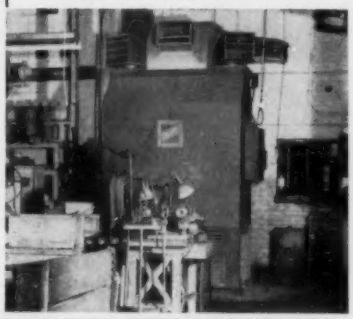
The existing boiler had to be modernized, an additional boiler and accessory equipment had to be added. Operating costs of this contemplated step were discouragingly high! Experience with space heaters suggested an alternative that promised real economies—dismantling of the steam plant and converting the entire plant to warm air heating. This plan was adopted on a 3 year basis.

From 1951 through 1953, twenty-four Dravo *Counterflo* heaters were put into service. Richards-Wilcox personnel installed recording instruments on every unit to determine fuel consumption and efficiency. After two years of service, the records show that Dravo heaters provided more than enough heating capacity for complete worker comfort and had *cut operating costs to less than half of the former system.* Service costs, too, were 50% less than anticipated.

Such economy is only a part of the many exclusive advantages Dravo heaters can bring in heating your plant, warehouse or building. It will pay you to thoroughly investigate quality Dravo heating systems—and see the dollars and cents reasons behind every feature. For prompt information, mail the coupon today.

This Dravo *Counterflo*, on the far wall, distributes heat up to 150 feet away. Richards-Wilcox's complete Dravo system of 25 units provides 21,700,000 btu per hour to a 6 acre plant area. Ductwork visible is part of abandoned steam heating system.

At the Richards-Wilcox plant, Dravo heaters serve dual heating jobs—heating both the local area and, through duct take-offs, serve adjacent areas.



Dravo Corporation, Department A-1312
Fifth & Liberty Avenues
Pittsburgh 22, Pa.

I am interested in Dravo Heaters for _____

☐ Please send literature
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Name _____

Company _____

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NEW PRODUCTS

(Begins on page 144)

parts and is made without springs. The removable nose takes a ⅛-in. pipe thread extension. The 45-deg angle of the nose aids in aiming the nozzle. Although weighing only 5½ oz, the unit is described as rugged. It costs less than $2.00 for a ⅜-in. line, and a bushing can be had for ¼-in. lines at slight extra cost. Mortimore Mfg Co.

53—CONTROL CENTERS save space, offer easy access

Featuring space saving, accessibility and rigidity, the Bulletin 6200 Type W Control Centers are available in Type A, B and C construction with NEMA 1 or NEMA 1-gasketed construction. Being

narrower than company's previous design, these control centers actually occupy less space. And space required around an installation is also reduced because no access from rear or sides is required for inspection or servicing of components, including horizontal and vertical bus.

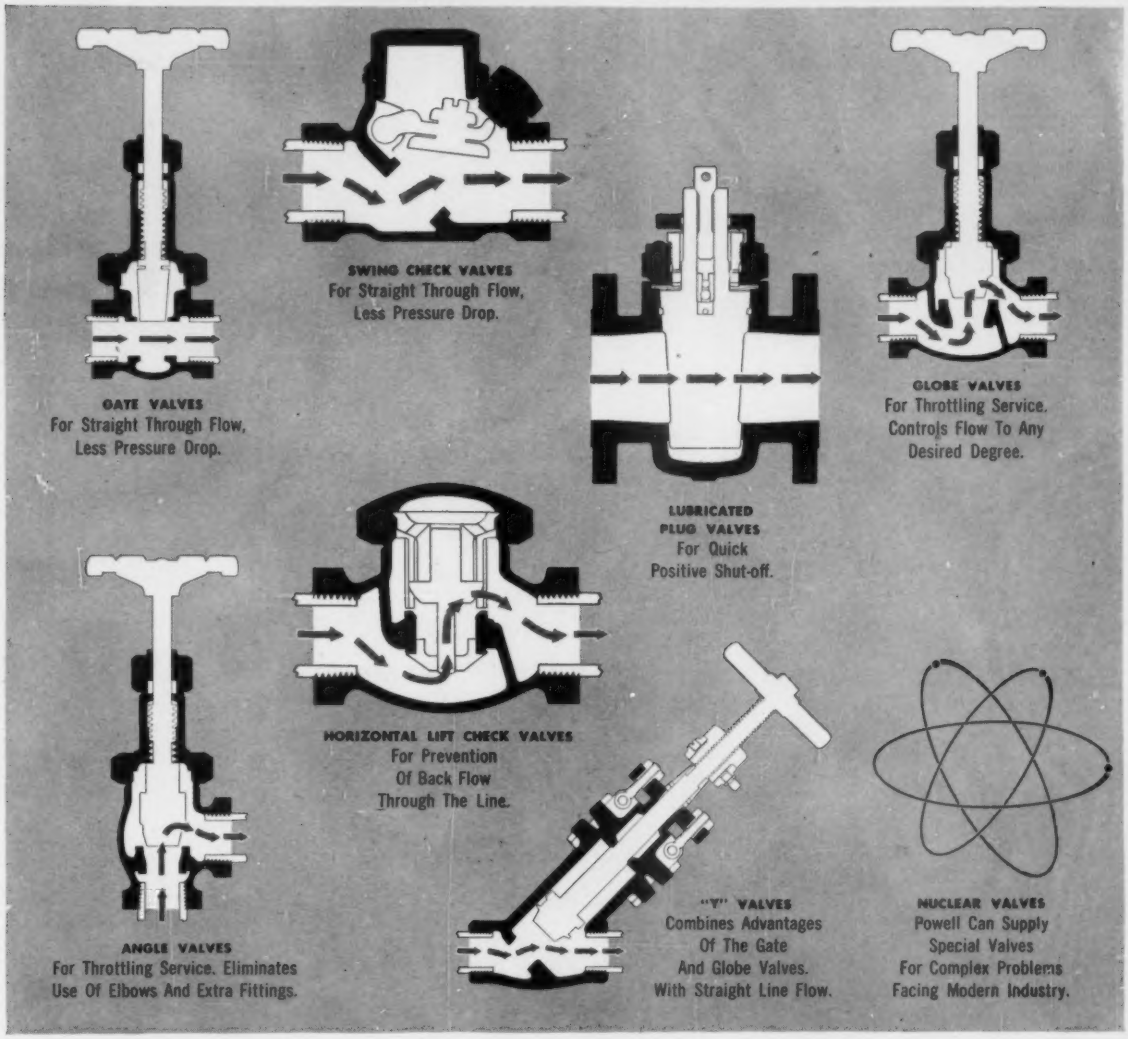
Basic vertical unit of the new line is only 20 in. wide, manufacturer states; yet it can accommodate six NEMA Size 2 starters with ample wiring space. Heavy gage steel is used for rigidity and points where load carrying ability is required are independent of the shear strength of screws. No hinge wiring is required and the door can be closed and latched. Clark Controller Co.

54—CURTAIN WALL affords cost design variation

Unit Wall is an exterior curtain wall system announced as permitting exceptional freedom of design at minimum cost through the use of only 10 standard prefabricated wall units. The system is reported particularly well suited to construction of one-, two- and three-story structures. Striking appearance is achieved through use of colored porcelain enamel paneled areas contrasted with satin finish aluminum mullions and frames. Interlocking split-mullion design provides for horizontal expansion and contraction, and at the same time simplifies erection.

Components, which include insulated

POWELL
for all valve needs



for every flow control problem there is a right Valve

Powell can supply this right valve—*made right* of the right material*. Every part of every valve must pass rigid inspection. And as a final step in manufacture, every Powell Valve has *Performance Verified* through an *actual line test.*

As an aid in selecting the right valve, the basic valve designs are illustrated here. For complete information on the wide range of sizes and materials available in each type of the basic valves illustrated above, consult your Powell Valve distributor. If none is located near you—or if you have a special flow control problem—write direct to The Wm. Powell Company, Cincinnati 22, Ohio.

PERFORMANCE
PV
VERIFIED

The Wm. Powell Company, Cincinnati 22, Ohio . . . 110th YEAR

POWELL VALVES

*BRONZE, IRON, STEEL AND CORROSION RESISTANT VALVES.

For more facts circle 619 on Reply Card

NEW PRODUCTS

(Begins on page 144)

panels, operable sash, fixed sash, and doors are factory-assembled and shipped complete with parts, including hardware. Wall units come in 9- to 12-ft heights, and in widths of 3 ft 4 in., 4 ft and 5 ft. Insulated panels are finished in porcelain enamel in blue, red, green and black, also come in an alumilited finish. All are of laminated sandwich-type construction. They have an impregnated honeycomb core, wedged between layers of tempered hardboard, and a textured aluminum outer surface. Kawneer Co.

55—FLOOR SEALER can go on newly-laid concrete

Among advantages announced for this concrete curing agent, hardener and sealer is that it may be applied to newly-laid (even wet) concrete surfaces as soon as they have been troweled. It is stated that only one application is required to cure, harden and seal against oils, dirt, greases, many chemicals and other foreign matter. According to reports it is resistant to concentrated hydrochloric acid, and provides a harder, more durable surface than many sealing materials. This sealer is easy to apply, says manufacturer —unskilled labor can spray, paint or mop the sealer onto any horizontal surface. West Disinfecting Co.

56—CONTROL UNIT for under window installations

Model CM is announced as a high velocity unit for installation under windows or on wall surfaces. It is described as a practical means of air distribution where space requirements necessitate high velocity air to be delivered to individual diffusers. The adjustable grille used on the Model CM assures rapid diffusion and draft-free distribution of conditioned air, it is noted, and the front of the cabinet is sloped to prevent the grille from being covered by objects that wou'd hinder air distribution. Specification Sheet F-7678 gives data. Barber-Colman Co.

57—THERMOSTAT for general purpose applications

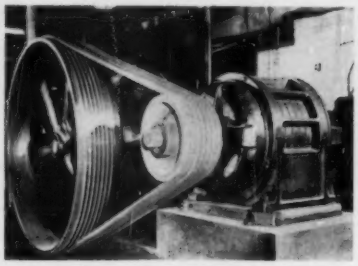
This general purpose industrial thermostat, with temperature ranges to 700 F, is designed for such applications as ovens, sterilizers, water and oil heating metal platens process ovens degreasing tanks, melting pots and compressed air heaters. Copper bulbs and capillaries are supplied for applications up to 250 F, and steel bulbs and capillaries up to 700 F. Standard bulb diameters are $\frac{3}{8}$ in. and $\frac{1}{4}$ in. capillary lengths to 180 in. Switching mechanism is double-pole, single-throw, snap-action, normally closed or normally open, for a-c operation. Thermostats can also be ordered for d-c operation. Case styles include knob and screwdriver adjustment types, depending on temperature range required. General Electric Co.

58—TAPE DISPENSERS are fully automatic in performance

This series of four models of air-operated tape dispensers is announced as fully automatic in performance. When you remove a length of tape, a micro switch acts to automatically set in motion the next delivery cycle. The dispensers are available for pressure sensitive tape in widths up to 4 in. Air Fixtures, Inc.

59—V-BELT is high-capacity low maintenance type

For applications where increased power transmission is desired with a minimum of maintenance on multi-V-belt installations, the Powerflex Hi-Capacity V-Belt comes in standard sizes and has an oil resistant cover to prolong belt life. The Powerflex is claimed to have 40 per cent more strength than many belts and to reduce belt failure to a minimum, and to promote increased bearing life because of lighter weight and lower stresses. Thermoid Co.

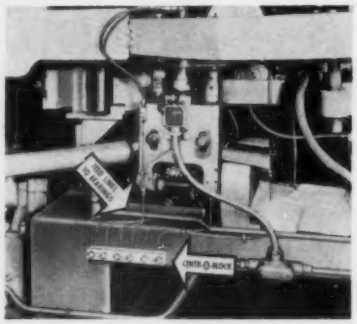


60—FLEXIBLE SHELVING offers storage versatility

Quick-Bilt Shelving is announced as easily assembled and rearranged for flexible storage requirements. Starting with a basic unit—base shelf, top shelf, back panel and two end panels—you slide in as many shelves as you need, select the required number of dividers from four sizes offered, snap them in place and the unit is ready for use. Manufacturer says the shelves slide in and out easily, can be raised or lowered without removing dividers, even when loaded, and are easily cleaned. Label holders, shelf boxes, peg panels and other accessories are available, and standard arrangements can be ordered. The Frick-Gallagher Mfg. Co.

61—MANIFOLD BLOCK serves to simplify lubrication

Even the smallest machine units can be lubricated in seconds with this new low-cost centralized lube system, it is claimed. The system consists of one or more manifold blocks, threaded for insertion of standard hydraulic grease fittings. Blocks are bolted to the most easily accessible location on the machine. Rigid or flexible feed lines connect bearings to inlet ports of the manifold blocks. Fittings can be contacted by any standard manually or power-operated application device, such as lever guns, bucket pumps or power lubricators. Bulletin 681-A gives full details. Lincoln Engineering Co.



Reader Service Cards on pages 195-196 make it easy to get further information on any of these products. Just circle the item numbers of the products you would like to know more about.

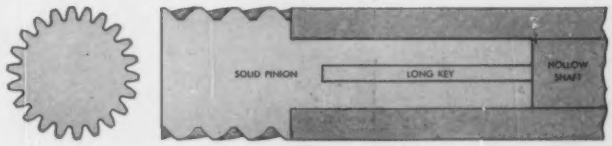
63—VINYL COATING is easily-applied protection

Ucilon Coating 1400 is announced as a vinyl maintenance coating that provides the corrosion resistance of previous vinyl-based coating, but eliminates strong odors and need for meticulous surface preparation. It is designed to resist acids, alkalis, water and other causes of early paint failure, and can be used for

In your opinion, which pinion?

. . . for longest life in a gearmotor

ORDINARY SHELL TYPE PINION



U. S. SOLID TYPE PINION

In an internally geared motor the pinion on the motor shaft is the vital link between motor and gearing. It's the fastest, but smallest gear, so it must be extra strong, free from vibration and forever tight. Now compare the U. S. Syncrogear motor pinion with the ordinary type. Note the extra large section area of the U. S. design. It has a long solid shank that anchors into the motor's hollow shaft, whereas the ordinary shell type has a small section area, short keyed.

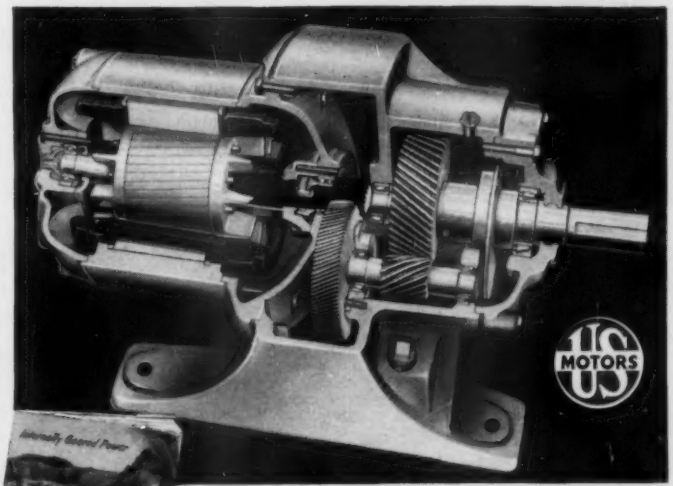
Obviously the U. S. design is most substantial, longer lasting, more resistant to deflection and can carry high speed loads far more safely than common designs. All the gears are deep-hardened and shaved to exact tolerances in the U. S. plants.

Added life lengthening features

The rugged pyramidal case supports the motor and gear train and all castings are normalized to insure permanent alignment and to prevent distortion. The motor windings are asbestos-protected to avoid carbonization and guard against burnouts. All moving parts are completely enclosed for weather and dust protection and confined within the least cubical dimensions on a single mounting. ¼ to 30 h.p.; 10 to 10,000 r.p.m.

THE ONLY MOTOR WITH A BUILT-IN PINION

U. S. SYNCROGEAR



REQUEST FOR SYNCROGEAR BOOKLET

U. S. Electrical Motors Inc. PLE-12
Box 2058, Los Angeles 54, Calif. or Milford, Conn.

NAME_____

COMPANY_____

ADDRESS_____

CITY_____ ZONE____ STATE_____

***FREE* 16-PAGE DESCRIPTIVE BOOKLET GIVES ALL THE FACTS**

Interesting multi-colored Booklet presents engineering facts you should know about geared motors, and illustrates the various U. S. Syncrogear types. Mail the Coupon for a copy. No obligation.

U. S. ELECTRICAL MOTORS Inc.

Los Angeles 54, Calif. **Milford, Conn.**

For more facts circle 621 on Reply Card

(Begins on page 144)

walls, floors, ceilings and exteriors of equipment to resist corrosive fumes in chemical processing plants and other industrial atmospheres. Self-priming coating brushes out like oil paint with no sagging or dripping, company says, and can be applied over bare metal, wood, masonry and most previously painted surfaces without special surface preparation. Its mild odor and high flash point (105 F) permit application without interference of plant routines, company notes. Available in 6 colors, the coating is mixed with Ucilon Thinner 1400-T or xylol at an 8 to 1 ratio for brush or spray application. Metal & Thermit Corp.

64—EMERGENCY LIGHT of improved design

Latest model in this company's Watchmaster series of automatic emergency lights has floodlight type, sealed beam lampheads with strong center beam to light long passageways or to pinpoint exits and critical controls. It incorporates a device designed to almost entirely prevent loss of water from the batteries by trapping and re-converting into water the hydrogen and oxygen given off in charging. This same device also serves to prevent corrosion around battery terminals and guard against explosion hazards from free hydrogen gas. Manufacturer claims 50 to 100 per cent added battery life for this unit and says water need be added only once each year or two. A timing mechanism is provided to guard against overcharging on "high charge." Automatalite Div., Carpenter Mfg. Co.

65—COUPLER for the portable aluminum pipelines

FMC Fast Move Coupler, for portable aluminum pipelines, is claimed to withstand working pressures to 1000 psi, and is offered in both OD and IPS pipe sizes. Manufacturer says it is the fastest acting coupler for this use. Heavy breach-acting jaws secure the coupler with a quarter turn. A lock screw spins

up and locks coupler against untwisting through line torque. No metal part of the coupler is exposed to material within the line, it is pointed out, and an aromatic resistant Buna-N gasket is placed so there is almost no disturbance of flow.

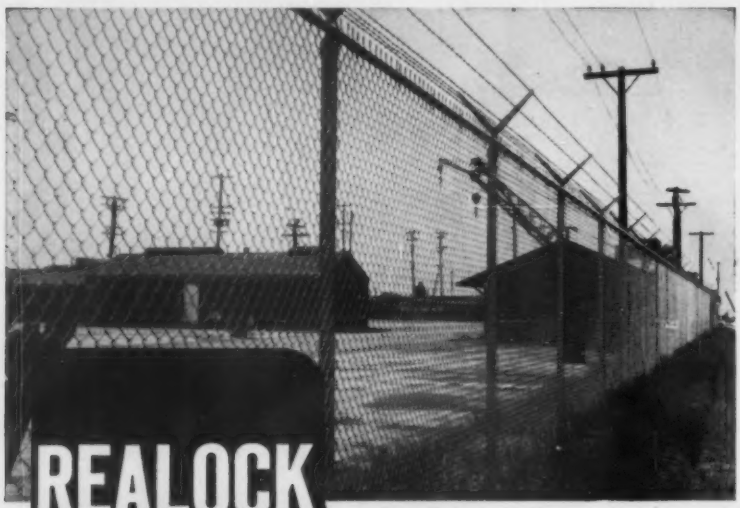
The coupler can take rough treatment, it is announced, and it protects the ends of the pipes from damage. In addition to applications in petroleum, construction and mining industries, this coupler and the pipelines for which it is designed are expected to be used in transmission of abrasive or corrosive materials, as well as sticky liquids and semi-solids, since the lines can be readily dismantled and cleaned. John Bean Div., Food Machinery and Chemical Corp.

66—CUTTING OILS suited for some difficult jobs

Towercut F Products are a new series of cutting oils. They are reported especially effective when applied to difficult broaching, gear hobbing and tapping jobs, where problems of high pressure, heat and friction exist. Tower Oil Co.

67—FIRST AID STATION for plant-wide use

Small enough to mount close to hazardous areas, yet large enough to hold all necessary first aid items, this wall-mounting first aid cabinet is especially useful where fast, immediate treatment must be given. Each of cabinet's two doors is fitted with a positive-action catch that cannot open as a result of vibration. Other safety features are rounded-corner construction and flush chrome hardware. Finished in durable, white, baked-on enamel, dimensions are 20 in. high, 24 in. wide and 11 in. deep. General Scientific Equipment Co.



REALOCK FENCE

helps you

- reduce number of guards
- prevent burglary, arson and vandalism
- stop pilferage

You get all of these advantages and more when you install a sturdy Realock Fence. The tough, heavy fence fabric will give years of service . . . terminal posts are made of full-weight tubular, I- or H-structural steel sections . . . and, for maximum security, Realock Fence is topped with three, five or six strands of tough barbed wire.

What's more, Realock is long-range protection. It's made of full-weight steel that's heavily galvanized after weaving so that it can give years of trouble-free life under all weather conditions.

THE COLORADO FUEL AND IRON CORPORATION, Denver and Oakland
WICKWIRE SPENCER STEEL DIVISION, Buffalo, New York 3387

REALOCK FENCE
THE COLORADO FUEL AND IRON CORPORATION

CF&I

BRANCHES IN ALL KEY CITIES

For more facts circle 622 on Reply Card

Sylvania's VHO lamp makes possible more light per foot from fluorescent lamps

Produces more than twice the light output of conventional 40 watt lamps!

Sylvania Research conquers Heat and Pressure—two major obstacles to more light per foot!

The VHO-lamp represents an entirely new concept in lamp design—an entirely new way to get more light per foot from fluorescent lamps.

To make this achievement possible Sylvania engineers have developed and combined these vital features:

1. New "Pressure Control" Center. The specially developed, exclusive internal and construction of the VHO lamp creates "cool spots" at each end which allow mercury to condense.

2. Neon gas replaces Argon. Sylvania discovered that Neon actually gives far greater efficiency at higher wattages than the conventional Argon.

3. Use of standard T-12 bulb. The popular T-12 bulb permits maximum effective production and use of ultraviolet radiation within the tube.

4. The Patented Sylvania Rapid Start System. This development for fluorescent lamps keeps filaments warm during operation of lamp, and encourages effective electronic emission from filaments at all times.

In appearance, the VHO-25 is a standard 4-foot T-12 lamp, yet it produces *more than double* the light output of 40-watt fluorescent lamps made until now.

Due to the substantially greater light output of the Sylvania VHO, High-Bay Industrial Fluorescent lighting becomes practical and economical. In Low Bay lighting, VHO lamps will, in many cases, prove more economical because fewer fixtures are required.

VHO lamps are also a new and practical answer to better, highly efficient street lighting . . . use a minimum of lighting units of less cumbersome size. They are also particularly suitable for other outdoor lighting applications such as store fronts, service stations, and floodlighting of outdoor industrial or commercial areas.

If you are considering plans which include lighting for new construction or modernization, the new Sylvania VHO fluorescent lamp will be of particular interest to you. For complete details consult your local Sylvania Representative, or send today for your free folder about the revolutionary Sylvania VHO Rapid Start Fluorescent Lamp. Write to:

Sylvania Electric Products Inc.
Lighting Division, Dept. G, Salem, Mass.
In Canada: Sylvania Electric Products (Canada) Ltd.
Shell Tower Building, Montreal

SYLVANIA

. . . fastest growing name in sight

LIGHTING • RADIO • TELEVISION • ELECTRONICS • ATOMIC ENERGY

For more facts circle 623 on Reply Card

NOELTING
Faultless CASTER
MATERIALS HANDLING
FACTS

INCREASING BY 30 TIMES THE NUMBER OF LOAVES OF BREAD HANDLED AT ONE TIME, BY ONE MAN, . . . WITH FAULTLESS CASTERS

That's quite an achievement—yet Barbara Ann Baking Company, Los Angeles, did it with a simple handling system, featuring Faultless Castered trucks. *Products of similar size might be handled just as economically IN YOUR PLANT.*

First, freshly baked bread is taken from the ovens, loaded on multitiered trucks and moved to a temporary storage area. Each fully loaded truck takes 270 loaves of bread. The trucks are temporarily parked side by side for maximum saving of valuable floor space. Next the trucks are easily and quickly moved to a bank of combined slicing and wrapping machines. Finally, the sealed and attractively packaged bread is stacked on wire pallets and moved in bulk on bread racks to city delivery trailer trucks. With this type of castered truck handling system, there is no costly unloading and reloading between operations.

DOUBLE BALL BEARING SWIVEL PLATE CASTER

The adjustable King Bolt holds the plate and two ball retainers firmly together, thus permitting the horn to swivel freely between the two full rows of balls. Stop nut on King Bolt assures solid construction for the life of the caster.

1100 SERIES CASTERS HELP CUT HANDLING

Faultless 1100 Series Casters are used extensively in the Barbara Ann Baking Company operation. The object of this bread handling system is to increase the number of loaves that can be handled at one time by one man. This Faultless installation *has multiplied as much as thirty times* the number of loaves one man can handle in the transfer operation from baking ovens to wrapping machines. Barbara Ann's polished hardwood floors are fully protected by Faultless Plaskite and Drawn Steel Wheels having smooth, rounded edges which will not chip, mar or scratch.

FAULTLESS SOLVES THE TOUGH JOBS

1100 Series Swivel Caster shown with Drawn Steel Wheel having two full rows of hardened ball bearings in lubricated, dust-proof, hardened raceways.

SERIES 1700 RIGID PLATE LIGHT DUTY CASTER

Has the same over-all height and same bolt hole positions, center to center, as the corresponding size of Faultless 1100 Series Swivel Plate Caster.

FAULTLESS CASTER CORPORATION
EVANSVILLE 7, IND.
Offices in Atlanta, Baltimore, Boston, Buffalo, Chicago, Cleveland, Dallas, Detroit, Grand Rapids, High Point, Indianapolis, Los Angeles, New Orleans, New York, Philadelphia, Portland, Seattle, St. Louis. Canada: Stratford, Ontario.

For more facts circle 624 on Reply Card

NEW BOOKS

for the plant engineer

On Reactor Shielding

REACTOR SHIELDING DESIGN Manual. Size 10¾ x 8⅜; 472 pp including index; illustrated; cloth bound. Published by D. Van Nostrand Co., Inc., 120 Alexander St., Princeton, New Jersey. Price $6.00.

THIS BOOK PRESENTS a highly comprehensive treatment of shield design methods and data; advanced mathematics are, of course, included. The volume contains contributions from a number of scientists at various sites.

The book is based on work of the Naval Reactors Branch of the AEC in the design, construction and testing of shielding reactor plants. The design methods described include detailed instructions of the use of general formulas in actual shield design, as well as brief derivations of many of them.

Section on Shield Engineering discusses uses of various materials such as stainless steel, lead, concrete and polyethylene. The economic comparison of various concretes should be of particular value and interest to the shield designer. The book also includes a discussion of placement of coolant machinery and structure inside the secondary shield, based on actual experience.

Blueprint Reading

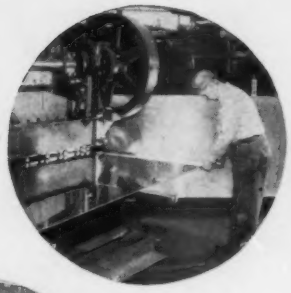
MACHINE TRADES BLUEPRINT READING by R. W. Ihne and W. E. Streeter. Size 10⅞ by 8¾ in.; 172 pp; illustrated; third edition. Published by American Technical Society, 848 East Fifty-Eighth St., Chicago 37, Ill. Price $2.95.

IN THE INTRODUCTORY chapter the reader is informed of the significance of blueprints and some reasons for their use. This is followed by material on visualization of objects represented by blueprints, and on understanding the various views of a drawing.

Then the book covers the language of drawings. This deals with different types of lines used in drawings, dimensions, notes and symbols. It continues with sections on the understanding of supplementary information, and the use of special views and assembly drawings.

Large portion of this book is devoted to a collection of production prints and groups of questions pertaining to them. This arrangement gives the student opportunity to apply knowledge acquired from the book and also to develop blueprint reading ability.

By supplying aluminum sheet



already sheared

to specified sizes,

an Alcoa Distributor has*

enabled his city to install 9,000 traffic

signs

at minimum fabricating cost

and without

tying up money or space in metal inventory.

*Your Alcoa® Aluminum Distributor can do as much for you. Look him up in the Yellow Pages. Aluminum Company of America, 953-M Alcoa Building, Pittsburgh 19, Pennsylvania.

ALCOA ALUMINUM
MILL PRODUCTS
ALUMINUM COMPANY OF AMERICA

Your Guide to the Best in Aluminum Value

FASTEN ALUMINUM WITH ALCOA ALUMINUM FASTENERS

THE ALCOA HOUR TELEVISION'S FINEST LIVE DRAMA ALTERNATE SUNDAY EVENINGS

For more facts circle 625 on Reply Card

New Plant Construction

(Continued from page 130)

N. Y., copper producers, miners and refiners, has plans under consideration for the construction of a pilot plant here, to test a new process for extracting alumina from low grade domestic clays. Plant will cost in excess of $1 million.

Morristown, N. J.—Mennen Co., manufacturers of toilet preparations, has announced plans for proposed expansion of company's office and manufacturing facilities, at new plant here. Two large wings will be added to the office structure and a large wing will be added to the manufacturing building. Cost of plant additions estimated to cost over $1 million.

Rahway, N. J.—Regina Corp., manufacturers of electric floor polishers and vacuum cleaners, has acquired a 12-acre tract where it plans to erect a one-story brick and steel structure for the manufacturing of floor polishers and vacuum cleaners. New plant will be built by the Calabro Construction Company, of Linden, N. J. Plant will contain a manufacturing area of more than 120,000 sq ft and is scheduled for completion in the spring of 1957. Estimated cost of plant $500,000.

Ashtabula, O.—Stauffer Chemical Co., 382 Madison Ave., New York 17, N. Y., has announced plans for the construction of a major plant for the production of titanium tetrachloride. Plant will be designed to supply the raw material for titanium sponge plant planned in the same area by National Distillers Corp.

Cleveland, O.—Eaton Manufacturing Co., 739 E. 140th St., has authorized plans for a major expansion program involving a total expenditure of $3.5 million on company's axle division here. Work calls for the expansion of manufacturing facilities, relocation of manufacturing and assembly departments and construction of a new building to cost approximately $1 million. Another $2.5 million will be spent for the purchase of new production equipment and machinery.

Towanda, Pa.—Sylvania Electric Products, Inc., Tungsten and Chemical Division, 718 Main Street, Towanda, Pa., plans to construct a new engineering and pilot production building to meet company's expanding activities in the semi-conductor, chemical and metallurgical fields. Plans call for the erection of a three-story brick structure with a floor area of 48,000 sq ft to be completed in mid-1957.

Charleston, S. C.—West Virginia Pulp & Paper Co., 230 Park Ave., New York 17, N. Y., has announced that a major expansion of company's paper making facilities at local plant here are under way. A new kraft paper making machine along with supporting facilities will be installed at a cost of $20 million. New machine will be placed in operation in late summer of 1957.

Houston, Texas—Diamond Alkali Co., 300 Union Commerce Building, Cleveland, O., has announced plans for a multi-million dollar expansion program to increase capacity of its Deer Park Chemical plant, near here. Construction will begin soon and is scheduled for completion by the first half of 1958.

San Antonio, Texas—American Can Co., 100 Park Ave., New York, N. Y., metal and fibre cans and containers, plans to construct a new can plant on local site acquired for the purpose. Proposed plant will produce about 275 million cans annually for beer and food products.

Roanoke, Va.—Thompson Products, Inc., 23555 Euclid Ave., Cleveland 17, O., has authorized construction of a new test facility for its accessories division on a 1,000-acre tract of land recently purchased by the company. New engineering and development center will be constructed over a five year period. Project to comprise some 14 buildings, including test cell structures, will cost approximately $10 million.

Chehalis, Wash.—Goodyear Tire & Rubber Co., 1144 E. Market St., Akron, O., has plans under consideration for the erection of new plant on local site here, for the production of tread rubber. Construction work is already

GALVANIZE

after Fabrication ?

Welding, cutting, shearing, punching, etc., leave exposed surfaces where rust has a chance to begin. If this work is done before Hot-Dip Galvanizing there will be no exposed surfaces. That's why we say—have your products Hot-Dip Galvanized after fabrication and there will never be a weak spot in your finished product.

Members of the American Hot-Dip Galvanizers Association have the know-how to do a top quality job. Write today for a list of our members and our STOP RUST booklet.

Send for free booklet

American Hot-Dip Galvanizers Association, Inc.
1806 1st National Bank Bldg., Pittsburgh 22, Pa.

Name_____

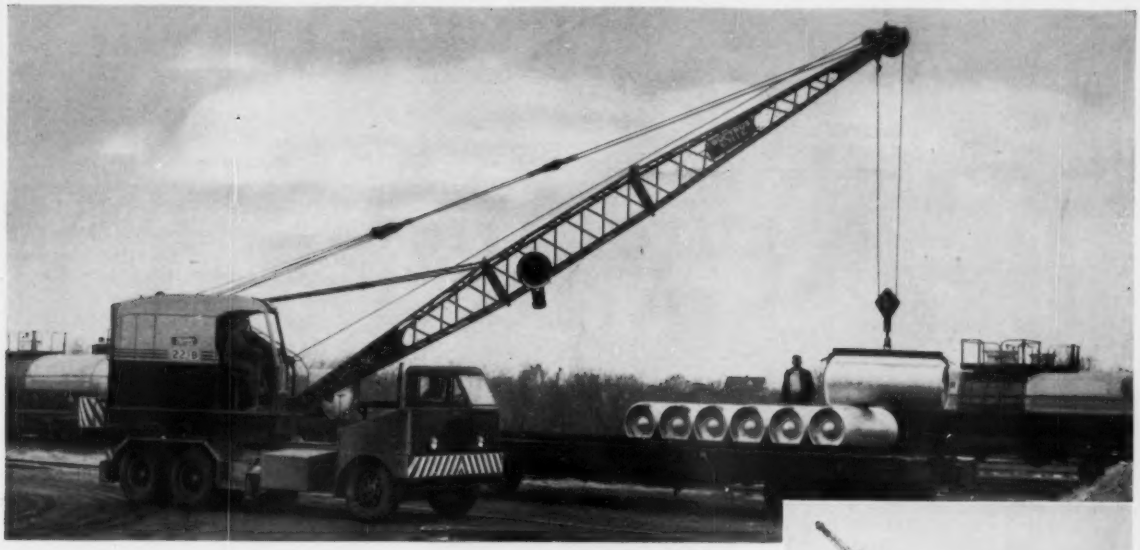
Firm_____

City_____ State_____

For more facts circle 626 on Reply Card

One of these 22-B Cranes Answers YOUR Handling Needs

Whether you are handling materials in widely scattered locations, over difficult terrain, or in close quarters, there is a Bucyrus-Erie 22-B crane which will do an outstanding job of handling your particular situation. Each has the power, long reach, and solid construction that help you save money through efficient, long-term service. 253E56



22-B TRANSIT CRANE

Reach and Mobility

Combining heavy-duty lifting crane features with rubber-tired mobility, the 22-B Transit Crane handles booms from 30 feet (standard) to 80 feet (with removable inserts), has lifting capacity of 25 tons. Job-to-job moves are fast and convenient.

Heavy Work

HEAVY-DUTY 22-B CRANE

An outstanding performer wherever extra strength and stability are vital, the Heavy-Duty 22-B has high maneuverability on rough or soft terrain. It is equipped with a 35-ft. boom, extendible to 70 feet through use of inserts. Long, flat crawlers with 30-in. treads, friction swing brake, power controlled lowering for the main hoist line, and telescopic pipe boom stops are only a few of its many features.

General Service

22-B CRANE

For a variety of jobs requiring highly dependable service, the standard 22-B crane can't be topped. Carrying a 35-ft. boom extendible to 70 feet, this machine has high maneuverability and great stability as well as independent power boom hoist and many other features you ordinarily find as optional equipment on other cranes.

For complete information on any one or all of these models, see your local Bucyrus-Erie distributor or write direct.

BUCYRUS-ERIE COMPANY

South Milwaukee, Wisconsin

For more facts circle 627 on Reply Card

under way and plant is expected to be placed in production early in 1957. Plant will cost about $1 million.

Nitro, W. Va.—Republic Steel Corp., 1405 Republic Bldg., Cleveland, O., plans to construct a new plant for the manufacture of steel drums and barrels. New plant will be located about 12 miles from Charleston.

La Crosse, Wis.—Trane Co., 206 Cameron Ave., La Crosse, Wis., has announced a major expansion program through 1957 to include two new manufacturing plants and additions to research and testing facilities. New plant with about 68,000 sq ft of floor space will produce brazed aluminum; the other, about 60,000 sq ft of floor space will produce low horsepower compressors. Research and testing center will be doubled at a cost of $600,000. Total program calls for an outlay in excess of $13 million by the end of 1957.

Adjustable Speed Control

(Continued from page 112)

plication of the adjustable drive is in operation at the baking division of First National Stores at Somerville, Mass., where 10 different kinds of bread, totalling some 65,000 loaves per day are baked. Briefly, the sequence of operations involves placing the dough in baking pans which will roll along a conveyor to the proofer in which the bread rises. When a row of pans has been accumulated they are automatically pushed into the proofer. At the end of the proofer the row of pans is automatically introduced into the ovens by a cross conveyor. The bread then travels through the ovens and emerges completely baked. Operation of the cross conveyor and the travel through the proofer and ovens are handled by variable control drives, see Fig. 2.

Different kinds of bread require different lengths of time in the proofer and oven, calling for variable speed drives for the conveyors. In addition, it is desirable to keep the ovens full in order to get maximum production. This is possible with the flexibility of variable speed operation permitting quick changes of speed when changing from one kind of bread to another. Better quality control and uniformity of output is also obtained.

That the variable control drive has a wide field of application is shown by its use for the drive of a whiteprinting machine. This drive is used because the drive speed must be constant according to its setting in order to produce good work, and a speed range of 1 : 30 must be available. Previous drives were not satisfactory in either respect, but the special drive solved both problems and the product was definitely improved.

When considering the selection of an adjustable speed drive control one should think of the machine and its drive as a single unit; what the drive requirements of each specific machine are; and what the future requirements may be.

Hard-to-Work Metal

(Continued from page 89)

for a springback allowance of from two to three times that of mild steel and kept well polished to avoid scratches and marks. Even greater allowance should be made for springback when forming tempers higher than annealed. Stretch forming has often been found more satisfactory than bending for the forming of large radii or higher tempers. Lubricants are often helpful in roll forming and die bending.

By proper design of the dies, extremely sharp corners with small radii are possible. Types 301 and 302 in the fully annealed condition will easily take 180-degree bends in thicknesses up to 3/16 in. Steel with higher chromium-nickel content and stabilized grades are only slightly less ductile in the annealed condition. Steady, continuous

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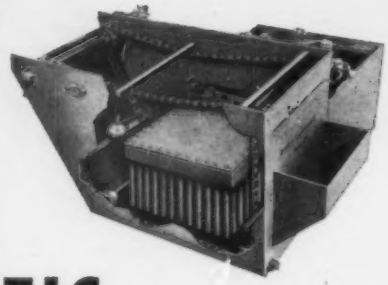

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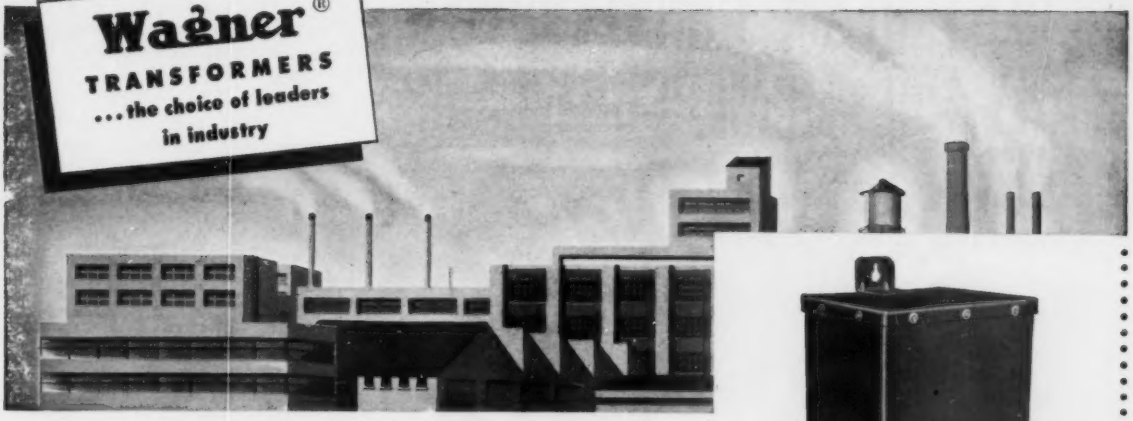

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The 150° rise transformer is standard in ratings 3 through 10 kva and is also available through 50 kva. The 55° rise model is standard in 1, 1½ and 2 kva and the 80° rise transformer is standard in ratings 15 through 100 kva.

Higher voltage single-phase transformers and three-phase transformers in ratings above 112½ kva are housed in ventilated enclosures formed of structural steel with removable panels. They are designed for floor or platform mounting and are suitable for indoor use only.

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forming, as in roll forming, is preferable (for the austenitics in particular) to abrupt, step-by-step forming, as on brakes, if complex contours are being developed.

Riveting: The chromium-nickel stainless steels may be riveted cold when the rivet diameter is less than 3/16 in. In order to reduce effect of hardening under cold work, it is desirable to set rivets up on hydraulic riveters in one blow rather than to do so in a rapid succession of blows. Button heads are recommended for cold work. On sizes over 3/16 in., hot forming usually is performed on coned-heat type rivets. Riveting of austenitic stainless steel rivets should be finished above 1600F; to insure this they are heated and soaked for a short time between 2050F and 1900F.

The straight chromium stainless steels, except Types 420, 440, 442 and 446 may be driven cold in smaller diameters.

Larger diameters should be hot riveted, but with martensitic types, heating should not exceed 1450F—otherwise air hardening may cause the heads of the rivets to snap off when cooling.

Maximum temperature used in hot riveting the ferritic types must be carefully controlled to avoid increasing grain size and consequent loss of ductility. Type 430 should not be heated above 1500F. Types 442 and 446 should not be heated over 1600-1700F.

Close temperature control furnaces are essential. Electric or muffle type furnaces are preferred to minimize scaling, and carburization. Ten minutes for chromium-nickel steels and 25 to 30 min. for straight chromium steels are suggested.

Rivet holes can be drilled or punched, with drilling recommended to prevent excessive stress. Punching, if used, should be followed by reaming.

Soldering: All types of stainless steel can be soldered, either with the soft lead-tin (50-50) or block tin solders. It is recommended only as a means of filling or sealing joints, and should not be depended upon for mechanical strength. Joints to be sealed by solder should always be spot welded, riveted, or joined by other mechanical means if strength is required. Welding is preferable where possible.

Brazing: Since stainless steels can readily be welded by any of a number of processes, brazing is not usually recommended as a standard joining technique. While it is possible to produce mechanically tight joints, the brazing alloy may penetrate the crystalline structure of the steel and cause brittleness and reduce ductility. Silver soldering is recommended over brazing if the work cannot be welded.

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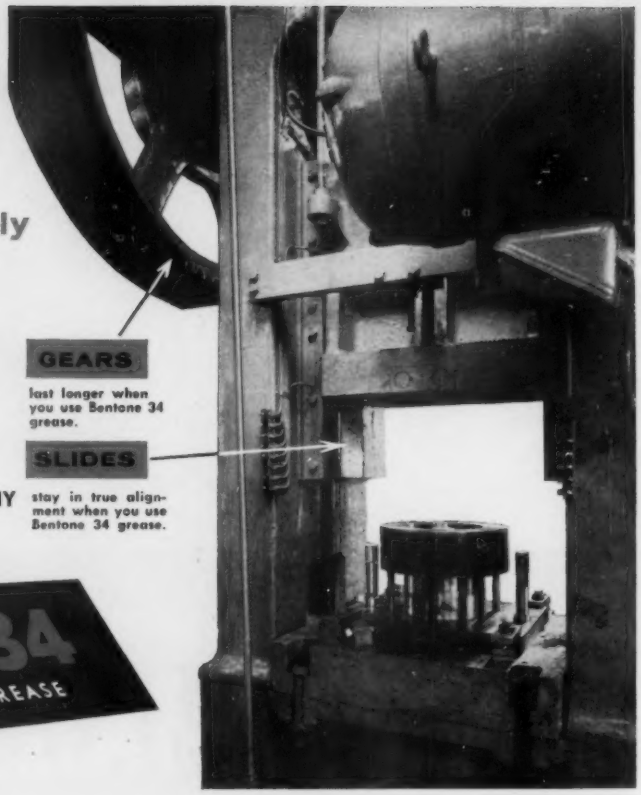

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(Begins on page 21)

160 Fluid Drives—Sixteen-pp Bulletin 9119 covers Gyrol fluid drives for 1/2- to 25-hp applications, including Types T, TM and VS Class 2 units for industrial use in the low horsepower range. Explains fluid drive principle and outlines advantages of the units. Typical performance curves showing starting torque, starting current and heat generation characteristics, and other charts showing typical adjustable speed torque curves are included. Selection tables are provided, as well as installation type drawings. American Blower Corp.

161 FHP Gear Motors — Bulletin GEA-6133A, 8 pp, illustrates product features and includes gear motor selection data, dimensions, ratings, and specifications of company's fractional horsepower gear-motors. A large cutaway view illustrates component features. General Electric Co.

162 Speed Reducers — Twelve-pp Bulletin 191 describes company's line of gear motors, separate motor reducers, and speed reducers. Design advantages are detailed through description, photos and drawings, and a large cutaway view showing component parts is included. Factors in speed reducer selection are also covered. Sterling Electric Motors.

Modern Approaches to Property Protection

163 Improved Padlocks—A wide range of padlocks for plant security are described and pictured in 8-pp Catalog 67. Features company's Secret Service locks of laminated hard wrought steel and laminated hard wrought brass, designed to offer strongest case construction. Also lists special length shackle padlocks, combination padlocks, special purpose models, and padlocks offering protection at low cost. Master Lock Co.

164 Aluminized Fence—Bulletin DH-16 is of interest to plant engineers concerned with property protection. Numerous applications of aluminized fences as well as special features and styles are listed. It features a modern addition to company's line—chain link fence of aluminized fabric and barbed wire. American Chain & Cable Co., Inc.

INSULATION

165 Building Insulation—Booklet FB-101, 24 pp, describes advantages and applications of Foamglas building insulation. Intended as catalog and reference booklet for architectural, engineering and maintenance personnel, it contains information on latest recommended procedures for use of Foamglas cellular glass insulation on flat roofs, pitched roofs, parking decks, curtain walls, core walls, wall linings, ceilings and perimeters. Many details and photos amplify text. Pittsburgh Corning Corp.

166 Pipe Insulation — This 40-pp catalog was designed as a reference guide to company's pipe insulation, presenting a new way to specify proper thickness for pipe insulation, based on the "I" factor. This special index eliminates complicated computation formerly required to determine economical thicknesses. The book also features detailed drawings that show how single-layer insulation is applied to various vertical and horizontal expansion joints as well as to pipe bends, flanges, valves and fittings. Charts and tables list physical and thermal characteristics. Union Asbestos & Rubber Co.

167 Pipe and Block Insulation—Form A-401 is a 6-pp bulletin describing advantages of 85 per cent magnesia pipe covering and block insulation. Applications are listed, and recommended thicknesses and other technical data are tabulated. The Eagle-Picher Co.

168 Glass Fiber Insulation—Microlite insulation, its performance and uses, is described in 4-pp Form WML-5. In addition to thermal and acoustical performance charts, this bulletin tells how Microlite is made, and what it is made of. Its many uses are also presented. L.O.F. Glass Fibers Co.

HEATING, COOLING

169 For Process Heating — Advantages of using Platecoils for process heating and cooling applications are described and illustrated in 18-pp Bulletin 154. Case histories of applications in a variety of industries, from alkaline stripping, flexseal coating, heat shield, and emulsion acid cleaning to rustproofing, lubricating tanks, metal parts washers, automatic surface coating, and tar transfer are presented and results described. Photos illustrate these typical applications. Platecoil Div., Tranter Mfg., Inc.

170 Heat Exchanger — Sixteen-pp Catalog 1156 covers removable tube bundle heat exchangers engineered for a wide range of heat transfer applications. Catalog contains all necessary design, capacity and dimension data required for selection and specification of exchangers for hydraulic equipment, diesel engines, gas engines, compressors, transformers, machine tools, cutting fluids and similar applications, and for chemical pharmaceutical and food processing. Young Radiator Co.

171 Improved Heat Transfer—Eight-pp Bulletin 1P-356 tells how to cut heat transfer costs with Platecoil, consisting of two embossed metal sheets of 14-or-16 gage, seam and spot-welded together to form channels for passage of heating or cooling media. Advantages are described and typical applications detailed. Dimensional data are tabulated and a table for converting lineal feet of pipecoil to square feet of Platecoil included. Platecoil Div., Tranter Mfg., Inc.

172 U-Tube Converters—Twelve-pp Bulletin 50 presents converters applicable to heating and process systems using water under forced circulation at low and high temperature levels. Capacity tables are arranged to allow easy determination of converter size, and a step-by-step method of selection is provided. Units described are company's Series K Paracoil U-tube steam-to-water convertors. Those designed for radiant heating applications are listed separately. Davis Engineering Corp.

173 Industrial Furnaces—Eight-pp Bulletin SC-175 shows and describes 27 standard rated surface heat treat furnaces. Illustrates a large variety of standard equipment for all types of industrial heating applications, from small laboratory furnaces to large continuous brazing furnaces. Surface Combustion Corp.

METAL FINISHING

174 Analyzing Plating Solutions — "Simple Methods for Analyzing Plating Solutions" is a 36-pp bulletin containing a discussion of analytical principles, use of apparatus and methods for sampling a plating solution. Outlines steps involved in 28 analytical methods for testing nickel, copper, silver and other metalfinishing solutions. Other sections of the bulletin describe equipment, component chemicals of solutions, atomic weights, acid concentrations and electro-chemical data. Conversion tables are included, and analytical reagents are listed for 10 plating solutions. Hanson-Van Winkle-Munning Co.

175 For Wet Blasting — This 56-pp fully illustrated spiral bound catalog contains complete descriptive material on a line of manual, semi-automatic and fully automatic wet-blast equipment. Well illustrated case histories covering a wide range of wet-blast job applications are one of the features of this catalog. Also enclosed are illustrations of the various standard units and full details on the type of abrasives employed in process. The Cro-Plate Co., Inc.

FASTENINGS

177 Self-Locking Socket Screws—Sixteen-pp Form 2193, describes and illustrates a line of self-locking socket screws and gives examples for a variety of applications in which the vibration-proof screws can be used. Sizes, critical dimensions, threads per inch, package quantities and weight per box are given, and specifications for the locking pellet give technical data on material, temperature range of application, resistance to fluids, durability and "plastic memory." Standard Pressed Steel Co.

Postage-free Reader Service Cards make it easy to order bulletins. Cards are provided on the facing page.

178 Improved Fastenings—This 24-pp catalog describes company's Flo-Form corrosion-resistant fastenings. Illustrates and describes special fastenings which are being produced in small quantity for individual jobs and in large quantities for original equipment manufacturers. Case histories of parts re-designed by company are completely covered and engineering drawings included. The H. M. Harper Co.

179 Electrical, Mechanical Products—Catalog 12, 36 pp, covers electrical and mechanical products manufactured by this company, including plastic screw anchor kit, Lok-On wire connectors, Snap-On metal straps, Tape-Mate fish tape winder and Ream-Rite, a tool for smoothing and bevelling freshly cut ends of thin wall conduit. Also describes plastic screw anchors, lead expansion anchors, lag and wood screw shields, toggle bolts, masonry drills, bakelite and ceramic wire connectors, plastic clamps and straps, fish tape reel and puller, wire strippers and others. Specifications are included. Holub Industries, Inc.

180 Boss Fittings—This 12-pp catalog illustrates and describes company's line of boss fittings and "O" ring adapters designed to satisfy straight thread boss standards as shown in the 1956 SAE Handbook. Also covers tube nuts, available in short nut, SAE long nut and 3-piece assemblies. Anchor Coupling Co., Inc.

AIR CONDITIONING

182 Precision Air Cleaning — Design and principles of air filtering employed by company's air filter are covered in this loose-leaf file of bulletins. Includes data on test dust used to determine capacity, loading characteristics, resistance, air cleaning performance of all types of mechanical air filters. Applications are listed and complete specifications included, as well as efficiency charts. The George Evans Corp.

183 Central Station Air Conditioning—Application and selection of central station packaged air conditioners is discussed in this 38-pp engineering manual. Includes physical dimensions, specifications, typical accessory arrangements, performance data, schematic piping diagrams, architectural specifications, water pressure drop tables and other engineering data. Most of this information is presented in tabular form, profusely illustrated with graphic detail in the form of drawings, diagrams and charts. Both water-cooled condenser types and those with integral evaporative condenser are shown. United States Air Conditioning Corp.

Equipment Ideas on Plant Communication

184 Two-Way Radio — Catalog C.3102 describes a complete line of two-way radio equipment for materials handling vehicles. Performance characteristic are detailed, as well as design and operating features. Specifications are also included. Radio Corp. of America.

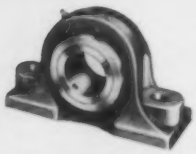
185 Annunciator Systems—Standard, integrated Panalarm annunciator systems for industry are illustrated and described in 32-pp Catalog 100B. Discusses company facilities, annunciator function and general features of the systems, typical industry applications, and presents operating sequences, enclosures, mechanical specifications, technical data and performance features of specific types of systems, available remote equipment and components, ordering information and engineering data. Panalarm Div., Panellit, Inc.

WELDING AND MACHINE SHOP EQUIPMENT

186 Flexible Shaft Machine—Grinding, sanding, polishing, buffing, wire brushing, sanding wood, and drilling in steel or wood can be done with attachments by the 1/4 hp multi-speed or single speed flexible shaft machines illustrated in 8-pp catalog 57. A complete line of accessories, flexible tool shafts, power drive shafts, others, is covered. Stow Mfg. Co.

187 Submerged Arc Welder — Design and operation features of a line of submerged arc welders for automatic welding operations are described in 20-pp Bulletin SB-1355. Cutaway views showing component parts are included.

DODGE PRODUCTS *you should know*



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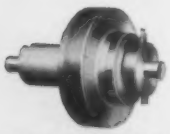

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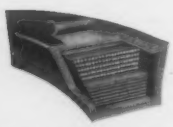

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DODGE BULLETINS YOU SHOULD HAVE

- **ROLLING BEARINGS.** Load ratings, dimensions and other data on Dodge-Timken and SC and SCM Ball Bearings. Bulletin A638.
- **CLUTCHES.** Diamond D, Rolling Grip and Air-Grip Clutches. Technical data, sizes and selection tables. Bulletin D56.
- **SEALED-LIFE V-BELTS.** Construction details and complete data on sizes, pitch lengths and outside lengths. Bulletin A606.

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BULLETINS

(Begins on page 21)

as well as photos illustrating typical applications and other details. Attachments for various automatic applications are also covered, and information on adjustments for positioning head, types of available power source, electrodes and fluxes is given. The Lincoln Electric Co.

188 Vibration Control—Bulletin 415B describes characteristics and installation of Neoprene vibration-isolating pads as low-cost machine mountings. Application of these pads in controlling vibration, absorbing impact and reducing noise is illustrated with photos of actual installations and cross-section drawings of three basic mounting methods. A load-deflection chart is included. MB Mfg. Co.

OTHER EQUIPMENT

189 Refractory Materials — Bulletin RB-20 is an 8-pp condensed catalog presenting company's line of fired refractory materials, covering 19 standard brands of refractory brick, for application in steel, ceramics, glass, cement, brick and clay, foundry, heat treating, petroleum, chemical and power industries. Classification, properties and applications of each brand are listed, and a selection chart and data chart giving detailed information on 23 mortars is included. Richard C. Remmey Son Co.

190 Expansion Sheet — Bulletin 4EL describes Boltaron 6200 unplasticized PVC expansion sheet for use as corrosion-resistant tank liner with built-in thermal compensation. Design and installation data is furnished, as well as a table showing typical test results. H. N. Hartwell & Son, Inc.

191 For Press Modernization—Bulletin ML-172 describes package applications for modernization of presses and similar machinery with pneumatic clutch and brake. These packages are complete and ready to install with a simple machining of the crankshaft end. Bulletin provides data on how to select proper application for a press, dimensions and flywheel inertia information in tabular form, photos of equipped press, and details on clutch controls. Fawick Corp.

192 Grinding Mills—Six-pp Bulletin AH-474 covers company's major types of reduction mills for both wet and dry grinding and pulverizing. Briefly described are tricone, rod, cylindrical, tube, batch, conical and disc-roll mills. Materials which have been dry or wet-ground in these mills are listed. There is also a description of grinding mill accessories and classifying devices. Hardinge Co., Inc.

193 Vertical Pressure Filters—Publications 6319 and 6320 provide complete details on vertical pressure filters with positive foolproof filter control, for use in industrial plants and other types of institutional and commercial applications. Furnishes operating details, data on filter bed materials, available accessories, as well as drawings showing various arrangements of two to four header units. Cochrane Corp.

194 Glassed-Steel Columns — Bulletin 940, 8 pp, describes advantages of using glassed-steel as a material of construction for columns for fractionation, stripping, absorption, extraction, chemical reactions, and other operations. Column design features are illustrated and described and dimensions are tabulated. Alloy columns are covered, and fabrication tolerances before heat treatment given. The Pfaudler Co.

195 Industrial Gloves—This 16-pp catalog illustrates and describes a line of industrial gloves and finger cots, including curved-finger rubber, latex, Neoprene, Buna-N, and Compar plastic gloves. A chart of finger cot sizes in actual diameters, and a recommended use table showing resistance ratings of various glove materials to 199 chemicals and solvents commonly used in industry are included. The Wilson Rubber Co.

196 Polyethylene Lab Ware—Bulletin P-965, 16 pp, illustrates and describes polyethylene laboratory ware, including items made of standard polyethylene as well as high heat types. It covers such standard items as narrow mouth bottles, beakers, funnels, tubing, sheeting, as well as hydrometer jars, wide mouth bottles, test tubes, centrifuge tubes, spigots, line valves, graduated cylinders, bottle rests, bottle carriers, pumps, stoppers, sink trap, others. Scientific Glass Apparatus Co., Inc.

Informative Booklets for Your Reference Files

197 Gaskets for Industry—This 28-pp catalog is offered as a help to users of gaskets, shims and washers, and illustrates and describes a variety of styles, shapes and materials. Includes data on ring, cylinder head, double jacket, corrugated metal, plain solid, self-sealing, and special types of gaskets as well as gaskets cut from a wide range of materials. A special feature of the book is a section listing more than 1500 stock dies. Chicago-Wilcox Mfg. Co.

198 Caustic Soda Guide — Technical Service Bulletin 102 is a 40-pp caustic soda engineering and handling guide for safe handling and storage of liquid caustic soda. Includes large detailed diagrams and photos of tank cars, piping, and storage equipment, together with recommendations for unloading, dilution, transfer and storage. A portion is devoted to materials of construction, and in addition there is a section on safety precautions and first aid treatment. Bulletin also contains many graphs, charts and tables covering physical data. Hooker Electrochemical Co.

199 Industrial Fabrics — This profusely illustrated 24-pp booklet describes composition and end uses of textiles combined with other materials, such as rubber, plastics and special-purpose compounds. A summary of fabric development, descriptions of basic fibers and yarns, fabric construction and designation are features of this book. Illustrations of various types of cotton duck, sateen, twill, drill airplane cloth, terry cloth, knitting backing fabric and Lantuck random-fiber non-woven fabric are included. Special applications of fabrics in combination with rubber, coated fabrics, fabrics in laminates, fabrics for abrasive use, and fabrics with other materials such as ink, silicones, are detailed. Wellington Sears Co.

200 Activated Charcoal—The "black magic" of activated charcoal, made from coconut shells, and how it can be used effectively for air recovery, odor removal, air purification, food preservation and as a solvent recovery is told in this loose-leaf notebook, which is divided into three sections that deal with equipment, applications and the charcoal itself. Illustrated technical sheets, cartoons and detailed reports are included. Equipment section covers activated charcoal filters and circulating units, air capacity, dimensions, resistances, horsepower, weights and other information. Pur Air Div., Barnebey-Cheney Co.

201 On Copper Removal — This 8-pp development bulletin describes a method that permits removal of copper deposits from steam generating units in the same stage with water-formed deposits. Discusses nature of the problem, solution to the problem, and shows supporting laboratory data and field tests. Dowell Inc.

202 Forgings for Tough Jobs—Fabrication and application information on forgings manufactured by this company is offered in this 8-pp bulletin, including data on sizes, forging stock, and forging shapes. Mechanical, metallurgical and economic advantages of forgings are listed. Indiana Forge and Machine Co.

203 On Data Processing—How you can select the correct integrated data processing system for specific needs is explained in this 24-pp bulletin, Form D-72. Discusses one-writing systems, punched cards, magnetic and punched tapes, telegraphic transmission, and electronic computers. Points out that practically all equipment involved in office automation can be linked. Ditto, Inc.

204 Acetate Envelopes—Transparent acetate envelopes for industrial use are described in this illustrated 6-pp bulletin. It contains photos, and information on dozens of styles and sizes available. Illustrating typical applications on job ticket production system, bulletin shows how instructions stay readable and work flows smoothly without interruption or make overs. American Kleer-Vu Plastics, Inc.

205 Fluorocarbons — Forms, properties and uses of a wide range of fluorocarbon products—from plastic resins to acids and dielectric fluids—are described in 8-pp Technical Bulletin 1-1-55. Detailed in the booklet are types and grades available of each form of fluorocarbon products and suggested use. Chemical Mfg. Div., The M. W. Kellogg Co.

68

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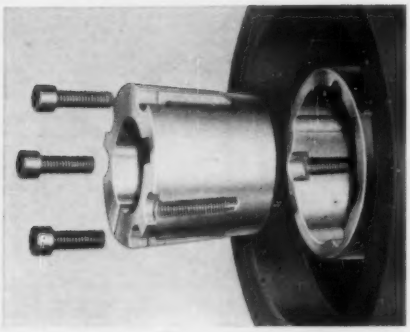

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DATA FILE of literature for the plant engineer's library

STANDARD CATALOGS, bulletins and handbooks are listed to help plant engineers maintain a permanent file. To get these free catalogs, circle item numbers of those wanted on postage-free cards provided for you on pages 195-196.

STORAGE EQUIPMENT

301 Adjustable Shelving—How this shelving can save assembly time is explained in 28-pp Form 2111. Photos and drawings of various types of shelving units, including open and closed shelving, bin units, ledge shelving, counter shelving, cabinets with swinging and sliding doors, parts and accessories are included. Standard Pressed Steel Co.

302 Storage Shelving—Rapid erection, strength and other advantages of manufacturer's storage shelving are stressed in this illustrated bulletin. Shows component parts, open types, closed types and some of the many combinations of dividers, bins, doors available. Also presents tool inserts, other shop equipment. DeLuxe Metal Furniture Co.

303 Steel Lockers—Catalog L-100A, 20 pp, features a complete line of steel lockers designed for safer storage, longer life and better housekeeping. Contains descriptions, illustrations and specifications for various types of units and storage combinations to suit a variety of different installations. Penco Metal Products Div., Alan Wood Steel Co.

304 Storage Equipment — Catalog 100-E, 72 pp, illustrates and describes company's complete line of steel cabinets, folding chairs, chests and safes, stools, tool boxes, work benches, tool stands, shelving, tool storage, lockers, coat racks, filing cabinets, revolving bins, others. Includes dimensions and other specifications. Photos illustrate some typical equipment installations. Lyon Metal Products, Inc.

MATERIALS HANDLING

305 Electric Hoists—Twelve-pp Bulletin DH 133B describes Speedway electric hoists of 500- to 4000-lb capacities. Fully illustrates and explains design features and gives details on suspensions and conducting systems. Clearance data, specifications included. Wright Hoist Div., American Chain & Cable Co., Inc.

306 Cranes for Big Jobs—A new 1½-yard shovel, 35-ton crane is described in this 6-pp catalog. Action pictures of the machine in quarries and gravel plants are included, also specifications. American Hoist & Derrick Co.

307 Overhead Cranes—Bulletin T202, 20 pp, gives full information on top running double girder cranes with top running trolley in capacities from 2 to 12 tons, spans to 60 ft. Data is also given on top running single girder cranes, both motor driven bridge types and head geared or push type in capacities from 1 to 10 tons, spans to 50 ft. Features which contribute to efficient operation and low maintenance costs are detailed. Electrical information included. Chicago Tramrail Corp.

308 For Overhead Handling — Booklet 2008-M, 12 pp, is replete with illustrative material on principal components of overhead handling systems. Track design and advantages of supporting it flexibly are described, and formulas and figures for comparing various track sections are included. Among subjects covered are various carriers for hand, electric and automatic operation; tractors; track switches; standard cranes, transfer cranes and gantry cranes; safety electrification; buckets and grabs. Cleveland-Tramrail Div., The Cleveland Crane & Engineering Co.

309 How to Choose a Crane—Designed to aid in the selection of overhead cranes, 8-pp Unit 79 shows how to analyze handling problems, decide on the type of crane desired and draw up specifications for crane proposals. Basic data is provided on classes of crane service, crane ratings and capacities and recommended speeds for bridge, trolley and hoist, along with standard dimensions and clearances. Gives 14 safety features. Whiting Corp.

310 Transit Crane—Twelve-pp Bulletin 15-B-TC-1 describes a transit crane of 15-ton capacity. Illustrated by job application photos and closeups of mechanical features, the booklet includes a list of specifications and working ranges, plus brief, easy-to-read description of the machines, advantages. Bucyrus-Erie Co.

311 Steel Conveyor Belts—"A profitable approach to the selection of steel processing conveyor belts" is the subject of this 16-pp bulletin. Simplified selection, standard specifications, and installation information are included. Photos and diagrams illustrate the text. The Colorado Fuel and Iron Corp.

312 Engineered Conveyor Systems—Catalog 835, 32 pp, illustrates conveyor systems in use in a wide range of industries, showing how they suit handling requirements involved. Roller, wheel, belt, chain, overhead trolley and elevating conveyors are included, also spirals, portable power conveyors, ball transfers and special equipment. Mathews Conveyer Co.

313 Fork Truck Efficiency Test—This 8-pp article explains how to tell when fork trucks need corrective measures. Lists equipment and facilities necessary for truck testing, tells how to test traveling efficiency and hoist speed measurements, shows suggested test data forms. Mercury Mfg. Co.

314 Electric Fork Trucks—Two electric fork trucks designed for high maneuverability, ease of maintenance, and operator comfort and convenience are introduced in two 6-pp bulletins. Bulletin 1324 covers a 4000-lb. capacity model; Bulletin 1325, a 6000-lb. truck. Performance, specifications, dimensions, details on controls and construction are given, features explained, and attachments shown. Baker-Raulang Co.

315 Adjustable Ramps—Engineering details and other information on use and installation of company's hydraulic adjustable ramps for loading docks are featured in this illustrated bulletin. Two types of dock equipment are treated — the Adjust-A-Dock, installed in the loading platform or at its level, and the Adjust-A-Truck, installed at ground level to raise or lower rear wheels of truck. Rowe Methods, Inc.

316 Hydraulic Jacks, Pullers—Bulletin Hydraulic-56, 16 pp, features company's line of hydraulic jacks and pullers. Prepared as an application guide for using various high-pressure jacking and pulling tools, it contains full descriptions, mechanical specifications and size charts, as well as illustrations of equipment in use. Templeton, Kenly & Co.

317 Sheet Lifter — Operational and design features of company's sheet lifting equipment, which contribute toward efficient handling, flexibility and economy are explained in Bulletin S-25, 16 pp. Cullen-Friestedt Co.

318 Electric Freight Elevator—Bulletin A-414, 12 pp, contains design and operation information on company's plunger electric freight elevator designed for low-rise, light and heavy duty freight handling requirements. A sectional diagram points out component parts, and an installation diagram and size and capacity table are included. Otis Elevator Co.

319 Oil-Hydraulic Lifts — Catalog RE-203, 20 pp, covers the field of heavy-duty oil-hydraulic lifting devices for industrial applications. Featured in catalog are company's standard Levelator lifts, a 6000 lb single-jack model and a 12,000 lb dual-jack lift. Also featured is an electric pump mounted on an oil tank for powering oil-hydraulic devices. Illustrates lift platforms, platform accessories and safety devices, jacks, power units. Rotary Lift Co.

320 Casters and Wheels—Catalog 138 is a 191-pp product manual on company's line of casters and wheels, describing design features and listing full specifications. Photos and drawings are used profusely to illustrate data, covering furniture casters, wheels, glides, desk shoes and various accessories. Darnell Corp.

321 Industrial Casters — Various types of casters for industrial applications are pictured and described in this large chart designed for wall mounting. Covers light duty, light-medium duty, medium duty, medium-heavy duty, heavy duty, extra heavy duty, trailer series, and special duty casters, and includes complete selection tables. Faultless Caster Corp.

322 Shock Absorbing Casters — Twenty-pp Catalog FH-53 describes construction features of company's Floating-Hub casters, listing types and mountings now available. Load ratings for each type and size are provided. Stresses, by text and illustration, how these shock absorbing casters work, permit smooth travel over rough floors. The Bassick Co.

323 Self-Dumping Hoppers — Bulletin 250 describes self-dumping hoppers reported to cut cost of hand unloading at least 50 per cent. Details rugged construction of the units, safety catch incorporated, other features. Standard models are pictured, as are some typical jobs handled. Roura Iron Works.

324 For Heavy Moving—How Mighty Movers solve heavy moving problems with economy, safety and speed is detailed in this illustrated folder. Lists various applications and includes specifications. Mighty Mover Co.

SLING CHAINS, WIRE ROPE

325 Industrial Wire Rope—Bulletin DH-128D, 24 pp, features wire rope recommendations for industrial services. Covers more than 120 types of wire ropes used in construction, conveyors, cranes, dredges, steel mill and blast furnaces, coal bridges, guy ropes, inclines, platform lift trucks and winch lines. Each recommendation covers such points as rope diameters, construction, preforming, lay, grade and core. In addition, charts covering weights and breaking strengths are provided. American Cable Div., American Chain & Cable Co., Inc.

326 Sling Chain Handbook—Illustrated Data Book 100, 32-pp, presents "how to do it" information on sling chains—from ordering to care, use and inspection. Contains diagrams, charts and tables on standard and special styles of sling chains and attachments, and their sizes, weights, and working load limits under many conditions. Columbus McKinnon Chain Corp.

327 Splicing Wire Rope—Instructions covering the methods used in making various types of wire rope splices are fully detailed in this 16-pp bulletin. Each step in the operation is described and illustrated with easy-to-follow drawings. Additional data is given in the form of tables. Macwhyte Co.

INSTRUMENTS, CONTROLS

329 Automatic Controls — Mercury-switch equipped controls for heating, refrigeration, air conditioning and other industrial uses are presented in 52-pp Catalog 856. Fully illustrated, book provides ordering and application information on a variety of pressure controls, temperature controls, level controls, limit and fan controls, and many others. Also presents data on relays, and on tilting-type and magnet-operated mercury switches. The Mercoid Corp.

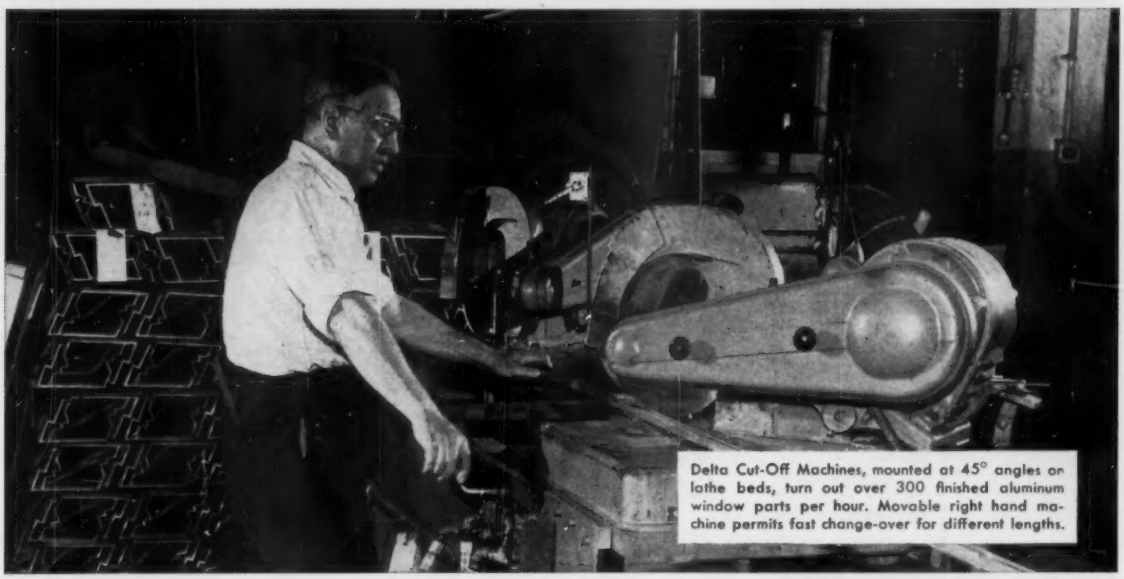
330 Service Regulators — Revised Bulletin 1026, 20-pp, features company's line of service regulators. Rate-of-flow graphs illustrate mathematically the determination of maximum outlet pressure build-up and amount of gas relieved to atmosphere by extra safety device in case of failure of regulator. Rockwell Mfg. Co.

331 Versatile Electronics—How flexibility of electronic temperature controls makes them useful in a wide range of heating and air conditioning installations is explained in this 16-pp booklet, Bulletin SA-2681. Purpose of publication is to fill the gap between the theory of electronic bridge circuits and specific control layouts and circuit diagrams. Four basic features that give electronic control its flexibility and application to a wide variety of installations are described. Minneapolis-Honeywell Regulator Co.

332 For Industrial Metering—Practical selection and application data on meters for in-

ROCKWELL-BUILT

DELTA cut-off machines



Delta Cut-Off Machines, mounted at 45° angles on lathe beds, turn out over 300 finished aluminum window parts per hour. Movable right hand machine permits fast change-over for different lengths.

...save cost of expensive special equipment

for General Bronze Corp., Garden City, L.I.

DUAL SET-UPS ARE FAST, ACCURATE—By adapting versatile Delta Cut-Off Machines to handle custom operations with limited production runs, General Bronze eliminated the need for expensive special tooling. The Delta machines give them the accuracy and fast change-over needed to turn out precision work at high speed.

COST LESS TO BUY, OPERATE—Delta Cut-Off Machines not only do precision work fast, but at far less cost. "These Delta machines have been in constant use for at least 15 years," says Joseph Gafney, plant engineer, "and they consistently give us the exacting, trouble-free operation we need."

LITTLE MAINTENANCE, FAST SERVICE—According to Mr. Gafney, the little maintenance that's been needed over the years has been done quickly and easily. "Delta salesmen have given us fast, dependable service when we've needed it," says Mr. Gafney.

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DATA FILE

(Begins on page 200)

dustrial liquids are provided in 20-pp Form 566. Explains value of metering in batch mixing, process and cost control. Illustrated charts show how to select proper meter according to type, temperature and flow rate of liquid to be metered, and include specifications for models shown. Strainers, valves and other accessories are described. Neptune Meter Co.

333 **Thermal Controls** — Descriptive and basic technical data on company's Thermoswitch controls are presented in 16-pp condensed Catalog 500. Products listed include the following types of controls: standard line, differential expansion; liquid filled snap-action, midget and miniature differential expansion; indicating controllers, bulb and capillary, and electronic. Fenwal, Inc.

334 **Scale Selection**—A variety of scales are presented in Catalog 651. Contains complete technical information on dormant platform, portable and bench scales. Also describes and illustrates meat packing, motor truck and dairy type scales. Introduces a heavy-duty scale with air-controlled filling device which measures light or heavy oils, chemicals, paints, varnishes, syrups and other liquids at the touch of a button. Detecto Scales Inc.

335 **Combustion Controls**—Included in this catalog (about 16 pp) are product descriptions of company's combustion instruments and controls. Covers damper controls; drive units; draft, air pressure and flue temperature gages; steam controls; panel board cabinets; low-draft cut-off switches. Pages are fully illustrated to show design and operational details, and brief text includes application suggestions, special features. Cleveland Fuel Equipment Co.

336 **Temperature Controls**—Eight-pp Catalog CC, on temperature controls and allied equipment for heating and refrigeration, provides information on recording, indicating, non-indicating controls; thermometers; bulb installation accessories; process timers, and gas pilots. Includes prices and references to detailed literature. The Partlow Corp.

337 **Control Relay**—Eight-pp Bulletin PL 7305-PM describes company's line of control relays, designed to occupy minimum panel space, and available in models with from two to 12 poles. Pictures 10 models, gives dimensions, enclosures, features, and data on maintenance and pole conversion from normally-open to normally-closed; and lists literature and template kits available. Clark Controller Co.

LIGHTING, SIGNALING

338 **Fluorescent Lighting**—This 24-pp fluorescent lighting guide book is a reference digest on fluorescent products. Gives advantages of this type of lighting; summarizes various lamps and parts, including starter sockets, lampholders. Includes reference chart for lamp performance when interchanged with typical ballasts. Sylvania Electric Products Inc.

339 **Guides to Luminaires** — Pocket-size, 28-pp Bulletin B-5799-BB covers fluorescent luminaires for industrial and other use. Summarizes salient features of each type of luminaire as it discusses electrical characteristics, maintenance and mounting data, details of construction, dimensions, and recommendations for application. Also contains a pictorial guide to floodlights and incandescent luminaires for industrial and other use. A 4-pp tabulation of buying data furnished. Westinghouse Electric Corp.

340 **Architectural Floodlighting** — Eight-pp Bulletin GEA-6437 illustrates various methods of floodlighting industrial plants, public and commercial buildings and others. Provides information on general purpose heavy-duty floodlights. Also contains tips on floodlighting of vertical surfaces and discusses four "musts" of an efficient economical floodlighting installation. A table of recommended foot-candle levels for exteriors provided. General Electric Co.

341 **Industrial Lighting Units** — The 36-pp 1956 Edition of the RLM Standard Specifications for industrial lighting units contains important revisions in specifications on both incandescent and fluorescent industrial lighting units, as well as new lighting data of special value to specifiers. Most important of the changes and additions are new coefficient of utilization tables for eight incandescent and fluorescent lighting units. Calculations are based on latest Zonal Method of computing coefficients of utilization and illumination on room surfaces. Also included are revised light distribution curves on RLM fluorescent lighting units. RLM Standards Institute, Inc.

342 **Lamps for Industry**—Eight-pp Bulletin 66 presents manufacturer's line of lamps for industrial service, indoors and outdoors. These include mercury vapor lamps, weatherproof floodlights, high bay reflector lamps, spotlights, infra-red lamps, spatterproof lamps, and others. Illustrated with photos, curves indicating candlepower, brief text covers features and applications of each type. Radiant Lamp Corp.

343 **How to Use Sound Signals**—This 44-pp combination manual, data book and catalog is an excellent reference work on industrial sound signals. Includes a simplified explanation of fundamentals of sound; a glossary of sound and signal terminology; a quick-comparison guide for selecting equipment; suggested steps in choosing a signal installation, and hints for compiling a code signal call system. Benjamin Electric Mfg. Co.

344 **Signal Equipment** — Tips on how to select suitable signals for any specific operation are offered in one of a series of bulletins—Nos. 100-125—bound in this 40-pp catalog. Other bulletins describe horns, bells, warning lights, other signal equipment. Specifications, photos, wiring diagrams, dimensions, audibility rating charts, electrical characteristics and other data included. Federal Sign & Signal Corp.

VALVES, TRAPS, PIPING AND ACCESSORIES

346 **Bronze Valves**—Globe and angle bronze valves with rising stems, union bonnets and stainless steel plug type seats and discs are described in this bulletin. Discusses design advantages, gives dimensions. The Walworth Co.

347 **Diaphragm Valves** — Catalog V-55, 34 pp, covers operation, installation and selection of diaphragm valves for handling of acids, alkalis, gases, volatile and viscous substances, water and other fluids, compressed air vacuum, slurries, semi-solids, beverages and food products. Diaphragm materials are described, selection tables included. Hills-McCanna Co.

348 **Lubricated Plug Valves**—Catalog PV-4, 36 pp, shows in detail a line of iron and steel lubricated plug valves. Many illustrations of single, screwed and bolted gland type valves are shown, including photos, sectional and detailed drawings. Also included is physical data on dimensions, ratings. The Wm. Powell Co.

349 **For Quick Valve Selection** — Here's a 20-pp catalog digest providing ordering and application information on gate, globe, angle and check valves in bronze, iron, cast and forged steel construction, also valve accessories and parts. Illustrated, includes pressure-temperature chart. The Ohio Injector Co.

350 **Valve Performance Facts**—Included in this 36-pp booklet are 32 case histories of cost-saving valve installations. Service applications covered include steam, oil, water, coating fluid, chlorine, phenol, pulp stock, vacuum, others. Industries include paper mills, refineries, central stations, other plants. Crane Co.

351 **Corrosion Resistant Valves**—Monel and nickel corrosion-resistant valves are described in Bulletin 9. Discusses corrosion-resistant properties of Monel and nickel, listing specific application for which each is suited. Gives casting composition of both alloys and describes their mechanical properties. Cross-sectional illustrations of gate, globe and check-type valves are included. Alloy Steel Products Co.

352 **High Pressure Valves**—Bulletin B-451, 12 pp, contains complete engineering data on company's valves for high pressure and high temperatures. Typical installations are pictured, dimensions and weights are tabulated, and temperature-pressure ratings are shown. A selection table is included, as well as information on materials, design. Yarnall-Waring Co.

353 **Valve Data**—This loose-leaf notebook contains a collection of company's bulletins

IDENTIFICATION DISC: An aluminum marking plate on all Walworth No. 225P's facilitates inventory control and makes reordering quick and positive.

take a good look at the Walworth "500 Brinell" no. 225P Globe

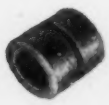
NEWLY DESIGNED HANDWHEEL: Patented air-cooled, finger-fit handwheel affords sure grip even with greasy gloves.

– the Toughest Bronze Valve Your Money Can Buy

The stainless steel, corrosion resistant seats and discs are heat treated to a hardness of 500 Brinell – hard enough to scratch glass and crush nails! The valve can be closed on sand, slag, and pipe scale without injury to the seating surfaces. "Wire drawing" is practically eliminated. All parts are accurately machined and gaged. Years of tight, positive shut-off are assured.

Available in both globe and angle types (angle type: No. 227P) in sizes ¼" to 2", this quality valve is recommended for 350 lbs. W.S.P. at 550 F, and 1000 lbs. non-shock service on cold water, oil, gas, or air.

For full data on this long-life, economical Walworth Bronze Valve, see your local Walworth distributor, or write for Circular.



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OVERSIZE STEM: The high-tensile strength silicon-bronze stem assures long life and protection against wear.

SEATS AND DISCS: Plug type seats and discs of stainless steel, heat-treated to 500 Brinell hardness and machined simultaneously to a mirror-like finish, with accurate tapers assures tight positive shut-off with minimum handwheel effort.

EXTRA STRONG BODY: Made of Composition M (ASTM B61) bronze. Thick walls and rugged hexes provide a high safety factor. Valves undergo hydrostatic shell test at 1,200 psi.

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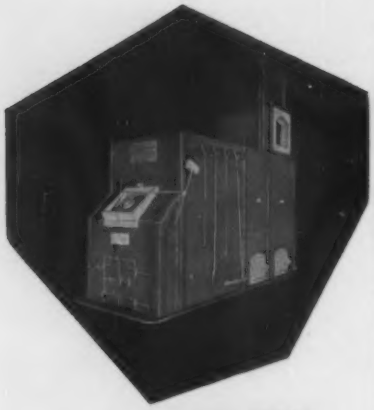

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DATA FILE

(Begins on page 200)

on its line of valves for control of air, gas, liquids and solids. It features complete operating, design, dimensional and specification data on butterfly, slide, automatic and proportioning valves, and is profusely illustrated with photos, drawings and diagrams highlighting valve design. W. S. Rockwell Co.

354 **Plug-Type Valves** — Long-life features of company's stainless steel plug-type valves are stressed in 6-pp Form 202-A. Cutaway view illustrates important design and operation features, and tables list sizes and dimensions. Jenkins Bros.

355 **Reducing Valve Engineering Data**—Bulletin 962 explains how the contour of a pressure reducing valve contributes to efficiency of performance. Discusses straightline flow, tight closing. A. W. Cash Co.

356 **Water Hammer Control**—Cause, effect and control of water hammer in piping systems is the subject of 8-pp Bulletin WH 851. Photos, drawings and curves supplement text, and test data is presented to show efficiency of company's silent check valves in water hammer control. Some typical installations are illustrated. The Williams Gauge Co., Inc.

357 **Steam, Air and Gasoline Traps**—Catalog 751, 32 pp, is a trap ordering book with capacity tables, installation diagrams, and containing charts and formulas for determining proper size trap for specific applications. Covers thermostatic steam traps, expansion steam traps, weight-operated traps for steam, air, gasoline, pressure up to 1500 lb. W. H. Nicholson & Co.

358 **Steam Trap Book**—Catalog J is a 44-pp manual and ordering guide in which 17 pp are devoted to data on fundamentals of good trapping and trap selection. Installation and maintenance instructions are also provided. Book lists steam traps for maximum pressures of 250, 600, 900, 1500 and 2500 psig. Included, also, is a section on trouble shooting. Armstrong Machine Works.

359 **Unions, Check Valves**—Illustrated Catalog 55, 24 pp, describes and provides ordering information on a line of forged steel unions and check valves. Socket-weld, high-speed, orifice, O-ring and other unions are included. Catalog provides service recommendations, dimensions and list prices. Also included is table covering discharge of water to atmosphere. Clayton Mark & Co.

360 **Improved Hose Coupling**—A quick connect-disconnect hose coupling for water, oil, steam, gas and chemical lines is described in this 16-pp bulletin. Describes the coupling's construction and explains how it provides a sealing action which makes the coupling tighter as internal pressure increases, and a full swiveling action that prevents hose twisting and kinking. Titeflex, Inc.

361 **PVC Pipe Fittings, Flanges**—This is a comprehensive 12-pp catalog on corrosion resistant pipe fittings and flanges in normal- and high-impact grades, rigid, unplasticized polyvinyl chloride. Shows characteristics, advantages and limitations. Lists operating pressures, temperatures, applications, price comparisons, fabrication advice, installation and supporting recommendations, dimensions and weights. Grinnell Co., Inc.

362 **Aluminum Pipe and Fittings** — Aluminum pipe—for conveying everything from air to acid — is described in this 18-pp Form AD197. Booklet presents characteristics and advantages for each major field of application. Specifications are provided, along with a description of appropriate fittings and methods of installation. Describes process industry applications and advantages. Similar treatment is accorded other fields, including pipelines, portable piping, and structural piping. Aluminum Co. of America.

363 **Plastic Pipe, Fittings**—Two types of unplasticized PVC pipe and fittings are described in 6-pp Bulletin T.D. 119, a normal impact grade and a high impact grade. Advantages of both types are given. Applications are listed by industry and process, and the full range of corrosion resistance is defined.

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It is 'Budgit' — the light-weight aluminum chain block you can carry and use anywhere for "spot lifting." The smallest size weighs just 29 lbs. but lifts 500 lbs. with a hand chain pull of only 25 lbs. Operation is smooth, fast, safe. Every part — from over-capacity hooks to big "full-jeweled" brake — is superstrong.

For maintenance in the plant or outdoors . . . for equipment installation . . . for daily production jobs . . . choose the 'Budgit' Aluminum Chain Block. Highest efficiency and long service life make it your best buy in "knock-about" hoists. Capacities: ¼ to 10 tons. *Get details from your Shaw-Box Distributor or write us for Bulletin 405.*

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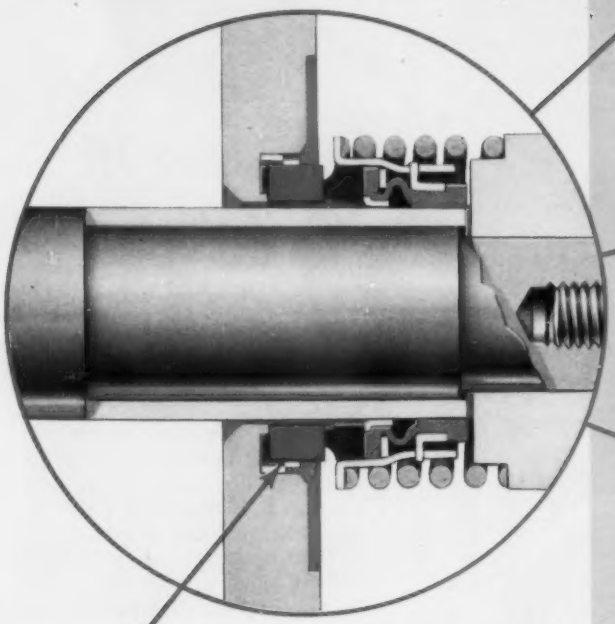
A great line of pumps all equipped with the

B&G TROUBLE-PROOF SEAL ASSEMBLY



Leak-Proof "Remite" Mechanical Seal

This exclusive B & G feature eliminates the customary leakage which occurs where a packing gland is used. A Carbon Seal Ring faces on a "Remite" floating seat—*a new type of material, so hard it will scratch glass—wear-proof and corrosion-resistant.* Metal parts are of steel, bronze or stainless steel, depending upon the type of service. The B & G Mechanical Seal is self-lubricating.

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Capacities to 1100 GPM, heads to 420 ft.

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Capacities to 1500 GPM, heads to 420 ft.

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Capacities to 150 GPM heads to 115 ft.

Take just a moment to examine the design features of B & G Centrifugal Pumps. You'll find plenty of reasons why these pumps are giving trouble-proof performance through long years of service.

Vertical split-case construction permits removal of the bearing bracket without disconnecting pipe lines or motor leads. Solid cast iron volutes—with support feet in the larger units—effectively prevent transmission of piping strains to the motor.

The shafts of B & G Centrifugal Pumps are an outstanding feature. Made of special alloy steel, they are super-finished and oversized to keep deflection at a minimum. The "Remite" Mechanical Seal— a B & G development—positively prevents leakage...and impellers are soundly designed to maintain hydraulic balance. An oil lubrication system, instead of grease cups, assures continuous protection to the long bronze bearings of these pumps.

B & G Centrifugal Pumps are available as all-iron, bronze-fitted, all-bronze and stainless steel units and in capacities which adapt them to a wide range of industrial applications.

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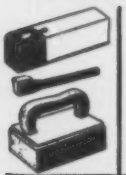

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Refinish commutators and rings to like-new condition even when ridged, scored or burned.

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Stop sparking — help commutation — prolong brush life. For all sizes of commutators.

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For more than surface smoothing—under machine's own power. Accurate to .001".

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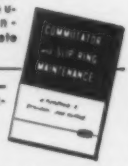
Cleans and burnishes commutators. Non-dusting. Complete size range.



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DATA FILE

(Begins on page 200)

Tables show physical properties, dimensions and weights, working pressures, burst pressures, other data. Installation instructions included. The Carpenter Steel Co.

364 **Pipe for Modern Buildings**—This 16-pp booklet discusses wrought iron pipe for modern buildings. Identifies wrought iron pipe and describes composition and advantages. Included are sections on wrought iron's resistance to corrosion and fatigue stresses, weldability, forming and threading, as well as the application of protective coatings to the material. Pictures illustrate applications. A. M. Byers Co.

FILTERING

366 **Filters, Strainers** — Industrial Catalog 1054, 48 pp, provides application and engineering information on company's line of micro-filters and precision strainers. Fuel filters, full flow and by-pass lube filters, air separators, and metal edge strainers for fuel lube and industrial use are presented along with construction details, performance data, and specifications. Purolator Products, Inc.

367 **Filter Fabric Facts**—This 16-pp illustrated booklet contains information about filtration principles; filtering devices; filter media; textile fabrics for filtration; a comprehensive chart on chemical and heat resistance of cotton and synthetic fabrics; sections on yarns, fabrics construction and finishing; and a round-up of filter fabrics in use. Wellington Sears Co.

PUMPS, COMPRESSORS

368 **Solids Handling**—Bulletin 121-A, 8 pp, describes non-clog pumps for handling solids in suspension. Included are vertical, horizontal and close-coupled types used to handle liquid components of industrial processes, industrial waste, and for such pumping applications as water supply, drainage and sewage handling. Specifications are included. Aurora Pump Div., The New York Air Brake Co.

369 **For Abusive Pumping Jobs** — Catalog 4906, 36-pp, covers centrifugal pumps for wide, industrial use and especially adapted to handling ashes, abrasive mixtures, slurries, hot and corrosive liquids. It describes several basic types; a horizontal shaft, single-stage side suction pump; a horizontal shaft, single-stage, rear-entrance automatic priming pump; vertical shaft pumps with standard, overhead and quill bearings for wet pit applications. Nagle Pumps.

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370 **Continuous Flow Pump**—Bulletin 30-C, 8 pp, outlines advantages of company's Moyno pumps which handle a variety of materials—from free-flowing liquids to non-pourable pastes, abrasives, solids. Describes principle of operation, discusses performance, construction, capacities, and includes photos, diagrams and specifications. Robbins & Myers, Inc.

371 **Circulating Pump**—Bulletin 1A-856 details seven advantages of company's Booster circulating pumps, and includes complete design and performance information. A capacity chart and specifications included. Bell & Gossett Co.

372 **Wet Pit Pumps** — Sixteen-pp Catalog 3007 covers heavy-duty pumps for drainage, flood water, effluent boiler blow-off, hot wells, acids and alkalis. Illustrations, tables and text give design features of these wet pit pumps. Catalog also includes a condensed version of the Standards of Hydraulic Institute data section listing metals used in constructing pumps

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Easy slag removal is just one of the many advantages of Airco 78E electrodes. This deep penetrating, all position electrode produces high quality weld metal which sets up rapidly. It is free from porosity, even when welding in the vertical down position. Especially recommended for welding mild steel where high ductility and tensile strength are essential.

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Mercury Fork Truck loading Mercury A-310 Trailers

Mercury Fork Truck stacking pallet loads at destination.

Mercury Tug Electric Tractor pulling loaded Mercury A-310 Trailers.

When moving material over 150 feet take the short cut to lower handling costs . . . the Mercury Fork Truck—"Trackless Train" System. One Mercury tractor provides the power that moves trailer loads over long distances. Mercury fork trucks load, unload and stack at receiving and destination points. The result—no wasted motive power—each unit performs its job at top efficiency.

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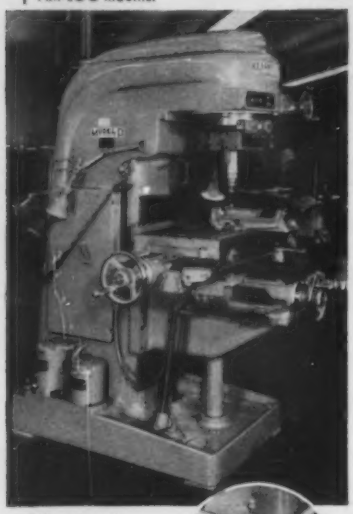

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- ✓ *Completely resists* oil, water, etc.
- ✓ *Reduces* transmitted noise & vibration as much as 85%.
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- ✓ *Eliminates* use of bolts and cement. Vinyl serrations hold machines to floors.
- ✓ *Reusable* when you move machines.

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DATA FILE

(Begins on page 200)

for handling various liquids. Also suggests factors to be considered in pump selection. Yeomans Brothers Co.

373 **Condensed Pump Data** — Form 4383-J covers more than 20 types of general service pumps, rotary pumps, sump and drainage pumps, condensate units, self-priming units, stainless steel pumps and high-pressure pumps. In easy-to-find tabular form, each model is pictured along wtih its characteristics, applications and features. Goulds Pumps, Inc.

374 **Compressors** — Bulletin A72, 36 pp, gives construction, operation information on company's Class WN-114 heavy-duty air compressors. Illustrates seven models of compressor as a single unit for displacement capacities from 1186 to 1948 cfm, twin units furnishing up to 3896 cfm. Joy Mfg. Co.

375 **For On-the-Spot Air** — Eight-pp Form 2302 features company's self-contained Spot-Air portable compressor. Deals with the many tools it will operate, with actual on-the-job illustrations pointing out added advantages of this light-weight compressor on jobs where bigger compressors are not needed. Ingersoll-Rand Co.

376 **Portable Compressors**—Twelve-pp Catalog GG-9A pictures 40 models of company's portable type compressors. A quick reference chart shows capacities, engine types, and mountings available. Illustrates such features as: replaceable cylinder sleeves, interchangeable valve parts, aircraft type compressor cylinders, heavy duty industrial type engines, and magneto ignition on all gasoline models. Le Roi Div., Westinghouse Air Brake Co.

PACKINGS, GASKETS, SEALS

377 **Packings for Chemicals** — Dura Plastic Teflon packing for sealing applications in the handling of corrosive chemicals is introduced in Bulletin 461 M.D. Stresses heat resistance of the material, chemical inertness. Discusses construction details and lists packings for use with specific chemicals. Durametallic Corp.

378 **Mechanical Seals** — Bulletin AD-150, 8 pp, features complete data on Type BB-21A Mechanipak seal. Tells how it works and illustrates operation and design features with cutaway drawings. Typical applications are listed and specifications are tabulated. The Garlock Packing Co.

379 **Teflon Products**—Three bulletins present this company's Teflon packings, gaskets, special parts and stock. Bulletin CP552 describes Chempro lines of Teflon ring packing, Teflon impregnated asbestos packing, V-type packing, and Teflon seal cage—for use with acids and strong chemicals. Bulletin CP553 covers Teflon jacket gaskets, solid ring gaskets, expansion joints and special gaskets. Bulletin CP554 illustrates special parts. Chemical & Power Products, Inc.

380 **Industrial Packings**—Performance characteristics and applications of company's packings are described in 18-pp Catalog PC-102, covering self-lubricating packings, molded packings, sheet packings and gaskets, folded asbestos packings and gaskets, asbestos rope and wick. Photos, cutaway views showing construction features, and dimensional data chart are included. Greene, Tweed & Co.

ELECTRICAL

382 **Motors for Many Jobs**—Bulletin 1878 is a colorful, 8-pp revamped publication including a more complete line of company's motors. Descriptions and illustrations cover open-type Uniclosed designs, totally-enclosed and explosion-proof types, Varidrives, Synchrogears, and right-angle models; also vertical motors and hollowshaft types. U. S. Electrical Motors Inc.

383 **Motor Buying Tips** — Bulletins GEC-1026A and GEC 1027A, each 11 pp, gives buying information on a selected group of this manufacturer's motors. Included are application data, ratings and prices for fractional horsepower motors, integral-horsepower poly-

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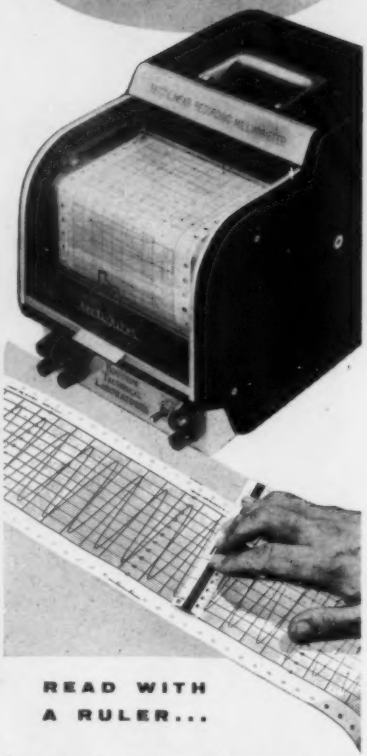

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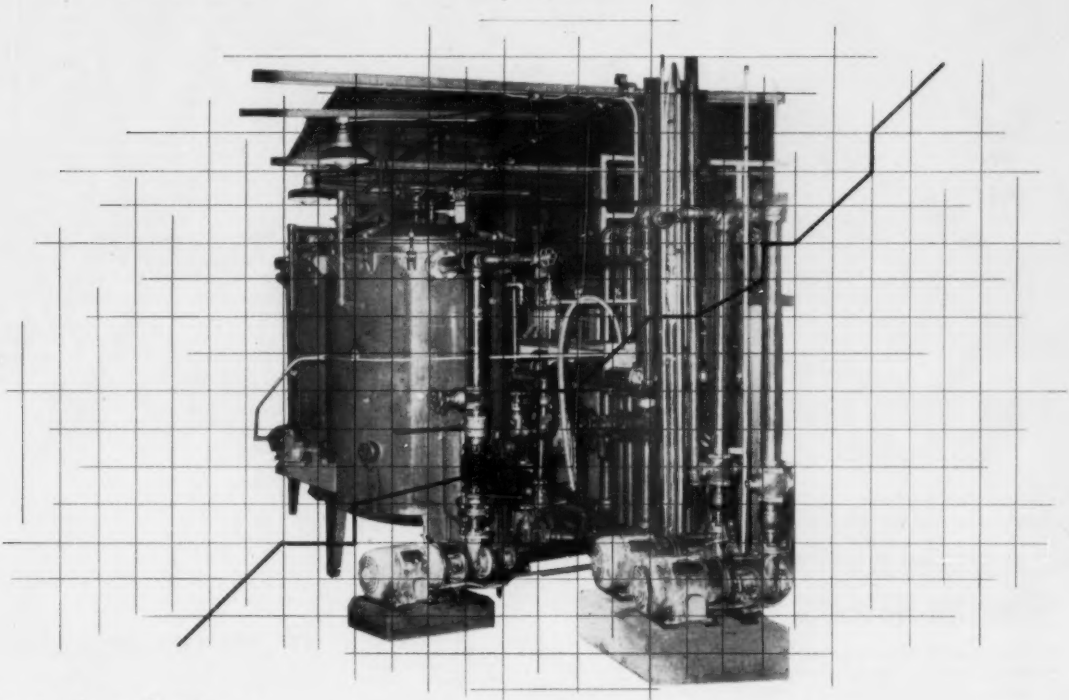
Hoffman engineered systems get **results:**



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- Sumps cleaned every three to four months instead of every 3 to 4 weeks; flushing system totaled less than 25% of original cost, including labor.
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- Tool-wear tolerance-loss cut sharply.
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- Longer production runs—more units per shift; operators enthusiastic about working with clean coolant.
- More work absorbed by same facilities, floor space and personnel.
- Sizable reduction in tool inventory.

Get the full remarkable story on Taylor's increased production, lowered costs and stepped-up efficiency. And find out how Hoffman engineered systems can get **results** for **you!** Write for free bulletin:

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INDUSTRIAL FILTRATION DIVISION Machine Tool Coolant Clarifiers—Flotation, Mechanical, and Magnetic. Lubricating and Insulating Oil Conditioners, Filters, and Vaporizers. Solvent Recovery Systems—Vacuum Stills and Filters. **ORDNANCE EQUIPMENT DIVISION** Special Pneumatic Conveying Systems. High Efficiency Centrifugal Separators. Stationary and Portable Vacuum Cleaning Equipment. Process Equipment. Pneumatic Systems for Radioactive Materials. **AIR APPLIANCE DIVISION** Multistage Centrifugal Blowers and Exhausters. Pneumatic Conveying Equipment. Industrial Vacuum Cleaning—Portable and Stationary Systems. Continuous Metal Strip Driers. "Smoothflow" Fittings and Tubing.

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DATA FILE

(Begins on page 200)

phase and single phase induction motors, motors and control for part winding starting, gearmotors and resilient-base integral-horsepower induction motors. General Electric Co.

384 **Polyphase Motors** — Bulletin 103 provides design features of company's Loadstar polyphase motors conforming to new NEMA standards and also gives tabulated information on the changeover. Open drip-proof and totally enclosed fan cooled motors are covered. Photos show construction details. Leland Electric Co.

385 **Motors**—General specifications for company's open drip-proof motors and splashproof motors, and enclosed motors are contained in 8-pp Bulletin 800. Includes data on construction features, electrical specifications, dimensions, mounting dimensions, as well as dimensional diagrams. Brook Motor Corp.

386 **Motors, Brakes, Transformers**—Bulletin G-55-2, 8-pp, outlines advantages of company's line of motors, brakes and transformers. Describes applications, construction features, and lists rating data. Wagner Electric Corp.

387 **Motor Speed Controls**—Eight-pp Form 927A features motor speed controls for adjustable-speed operation of d-c motors from a-c lines. Applications and advantages are listed, operating principle is detailed, and specification, price and dimensional data is included. General Radio Co.

388 **FHP Manual Starters**—Bulletin 224 is a folder giving the features and ratings of a line of fractional horsepower manual starters. Lists applications for them. Square D Co.

389 **What You Should Know About Circuit Breakers**—Sixteen-pp Manual 101 explains operating principles of basic circuit breaker designs and provides engineering data on factors of application. Includes simplified diagrams of three basic types. Illustrates with colored charts and diagrams, explains temperature factors, in-rush current effects, tripping and reset time. Heinemann Electric Co.

390 **Enclosed Switches**—Catalog 83, 28-pp, describes in detail enclosed switches for industrial applications. Included are general switches designed for use on either a-c or d-c purpose switches, sealed switches, heavy-duty limit switches, hand operated switches, and maintained-contact switches, all of which are available in a variety of actuator designs, contact arrangements and electrical ratings. Photos, dimensional drawings, circuit diagrams, electrical data are included. Micro Switch, Div., Minneapolis-Honeywell Regulator Co.

On pages 195-196 are two postage-free Reader Service Cards provided for your convenience in ordering these catalogs. You may also use the cards to order any literature mentioned in ads.

391 **Low Voltage Switchgear** — Twelve-pp Bulletin 6004B presents low voltage switchgear of the metal-enclosed, drawout type for indoor and outdoor installation using Types K and LG air circuit breakers. Design and construction details are explained and illustrated and emphasis is placed on safety advantages afforded by test position with door closed. General specifications and standard frame arrangements given. I-T-E Circuit Breaker Co.

392 **Commutator Slip Ring Maintenance**—This practical little 40-pp handbook gives procedures and methods for commutator and slip ring maintenance. Generously illustrated with photos and sketches, booklet contains sections devoted to common troubles and their corrections; brushes; general maintenance; and company's products for maintenance of commutators and slip rings. Defines commutator terminology. Ideal Industries, Inc.

393 **Panel Components**—Bulletin EE-120 is a 54-pp panel builders handbook of electrical components, containing specifications, diagrams, dimensions, photos and price lists of company's motor control. Profusely illustrated with photos, dimensional and wiring diagrams, bulletin covers manual starters, relays and contactors, magnetic starters in non-reversing, reversing, and multi-speed types, and a group of accessories which include thermal overload relays, oil tight pushbutton units, limit switches, timing devices, solenoids, electrical interlocks, and solenoid-operated brakes. Cutler-Hammer, Inc.

394 **Electrical Conduit**—This 8-pp bulletin, Form 646, describes company's heavy-duty, rigid steel electrical conduit, reproducing test data sheets to show how the protected conduit stands up under corrosive attacks of salt spray, sulfuric acid, caustic acid, and exposure to excessive heat. Four-color photos illustrate the effects on this and other conduit after exposure to attacks listed above. National Electric Products Corp.

395 **Aluminum Conduit Fittings**—To fulfill the need for electrical equipment made of materials which resist corrosive attack of many chemicals destructive to ferrous or standard aluminum equipment, Bulletin 2681 presents a broad selection of Condulets and related equipment utilizing copper-free aluminum alloy in their construction. It includes Condulets, lighting fixtures, plugs and receptacles and others for both hazardous and non-hazardous locations. Book provides a pictorial-descriptive index plus full catalog listings, prices. Crouse-Hinds Co.

396 **Wire and Cable**—Bulletin 1096, 16-pp contains detailed information on electrical wire and cable, as well as insulation and protective covering. Two selection charts—one by application and environment and one by cable type—are a practical guide to selection of best cable for a particular application. Minimum standard industry specifications are listed. Trade names are also given. The Okonite Co.

397 **Switch Wiring Diagrams**—Bulletin 709 is a 36-pp booklet of typical wiring diagrams for across-the-line starting switches. Indexed and arranged for easy use, this booklet serves

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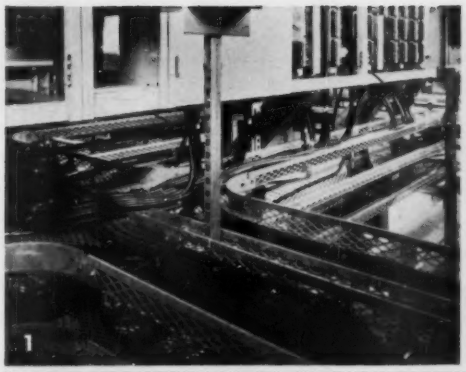

1 Smaller Diameters and light weight of RoMarine-RoPrene make it your best choice for trays, racks, and other metal race-way installations.

2 Easy To Pull, Rome Power distribution cable slips quickly into manholes and through conduit or duct runs.

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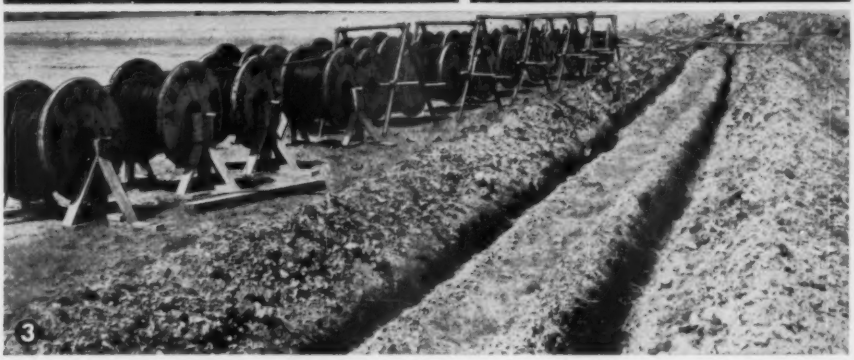

Underground, in ducts, and overhead . . .

Rome's power distribution cable helps you cut costs three ways

When you install RoMarine-RoPrene cable instead of a cable with metallic covering, you can save money three ways:

- **Lower original purchase or replacement cost**
- **Easier termination and splicing**
- **Reduced inventory levels**

Extremely versatile and tough, RoMarine-RoPrene cable can be buried directly in earth, installed in ducts or conduits, or hung overhead on poles. No longer must you stock three different kinds of 600-volt cable. And easier termination and splicing will provide further economies—every 30-minute saving is worth more than $2.00 to you!

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Besides economy, you get real dependability from this versatile and rugged Rome cable. The tough Neoprene jacket assures an exceptionally long service life. It's light in weight; it's virtually immune to the effects of electrolysis, corrosion, and temperature extremes; and it's highly resistant to oils, acids, alkalies, moisture, abrasion, flame and weather.

All in all, this is an ideal 600-volt cable for electric utilities, industrial plants, rural electrification, and airport wiring. And it can often be used as a building wire that will save you money in the long run.

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RoMarine-RoPrene is specifically approved by Underwriters' Laboratories as Type USE for underground service entrances. And it's approved by the CAA for airport wiring when CAA Specification L-824—with Type A insulation—applies.

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To get real economy *and* dependability, specify Rome's power distribution cable—RoMarine-RoPrene—for your next job. Contact your nearest Rome Cable representative for more information—or write to Department 602-B and ask for Bulletin RR-2. Rome Cable Corporation, Rome, New York.

ROME CABLE

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Why Faucets Leak

Faucet washers, when fastened with TOO LONG or SHORT screws — as in "9 out of 10" replacements by best mechanics — quickly work loose, destroy themselves!

"SEXAUER" finds the answer—after 34 years research

Note Nylon plug — locks screws automatically

Note Fiberglas backing — resists closing squeeze

Now, NEW Pat'd. "Sexauer" SELF-LOCK screws, with expanding NYLON PLUG imbedded in the threads, fasten and *lock* at correct depths AUTOMATICALLY, hold faucet washer *firmly*. Made of rust and corrosion resisting Monel, heads won't twist off, screw slots won't distort; they can be used over and over.

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EASY-TITES are made of super-tough, pliable duPont compound (neither rubber nor fibre) to withstand super-hot water and make tight even on worn, corroded seats. They are further *reinforced* with a vulcanized layer of Fiberglas to resist distortion and splitting from shut-off squeeze.

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NEW SELF-LOCK SCREWS and EASY-TITE faucet washers are just part of the "SEXAUER" line of over 3000 TRIPLE-WEAR plumbing repair parts and Pat'd. precision tools.

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DATA FILE

(Begins on page 200)

as a guide to some of the many ways in which this company's manual and magnetic across-the-line starters can be applied. Some of the diagrams incorporate more than one useful feature. Includes key to electrical symbols used. Allen-Bradley Co.

398 Trolley Busway Systems—Three bulletins offer real help on electrical installations involving cranes and hoists, assembly and production lines, moving test lines and other moving electrical equipment. Bulletin 35 (28 pp) covers 225-500 amp systems; Bulletin 50 (44-pp) 100 amp systems; Bulletin 45 (40-pp) 60 amp systems. Each includes special sections on installation planning and procedure, methods of mounting and descriptions and illustrations of equipment. Feedrail Corp.

399 Asbestos Insulation—"Specifications for Asbestos Varnished Cambric N.E.C. Type AVA Lighting Wire and Power Cables," 8 pp, establishes performance tests for asbestos insulation applied as a feltcd wall in combination with varnished cambric tapes for wires and cables with 600 and 1000 v ratings. Also measures plus values ot the construction over and above industry standards. Standards for test characteristics, such as minimum permissible breakdown after initial dielectric test are covered. Rockbestos Products Corp.

400 Testing Instruments — Bulletin 19-56, 16 pp, features company's electrical testing instruments, including ohmmeters, ground testers, dielectric test sets, motor rotation tester, cable fault locating equipment, transformer turn ratio test sets, corona test equipment, frequency meters, tachometers, others. Includes photos and descriptions of each type, including chief features, operating ranges, and suggested applications for them. James G. Biddle Co.

401 Battery Manual—Battery selection techniques are emphasized in 20-pp Bulletin 210, a revised edition of this manufacturer's manual on storage batteries for stand-by power, emergency lighting and switchgear applications. A discussion of charging equipment and simplified battery maintenance procedures is included. Storage battery installation procedures are described and illustrated by photos. Exide Industrial Div., The Electric Storage Battery Co.

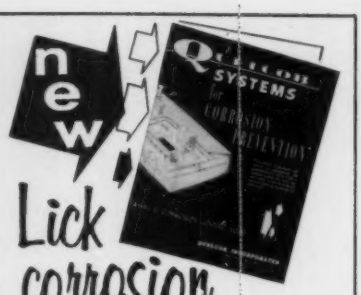
402 Handbook on Storage Batteries—This 64-pp booklet of instructions and technical data is the sixth edition of this company's battery service manual. Provides a brief treatise on the theory of the lead-acid battery. Gives detailed instruction on the care and operation of batteries, on maintenance and repairs, and on standard and special parts. Booklet is of special value to plant engineers concerned with storage batteries for cycle service in industrial trucks and materials handling equipment. Gould-National Batteries, Inc.

403 Motive Power Batteries — This 48-pp general service manual on lead acid batteries for all types of motive power application is a practical guide to industrial cycle service, including industrial truck, air conditioning, and others. Includes photos, charts, tables, methods of repair, maintenance and theory of operation, instructions covering repairs with regular or special tools, simplified testing methods, including safety practices, acid handling precautions, and charging methods. C & D Batteries, Inc.

404 Flexible Cords — This well-illustrated 24-pp booklet includes all new Underwriters' classifications for flexible cords manufactured by this company. Featuring data on Dynaprene and rubber jacketed cords as well as braid covered types, also gives tips on how to select proper cord. Whitney Blake Co.

TOOLS, WELDING, AND MACHINE SHOP EQUIPMENT

405 Data for the Shop—"Fluids and Facts for Metal Working" is a pocket-size booklet of about 44 pp. A section on metal working fluids covers their function and selection, preparation and use of soluble oils and paste compounds, and prevention of dermatitis. A section on metal working facts gives conversion tables, steel numbering systems, machinability ratings of metals, drill grinding charts, twist drill sizes and other data. Standard Oil Co. (Ind.)



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IN YOUR PLANT...
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If you have a corrosion problem it's **costing you money!** And chemical corrosion doesn't respect a maintenance budget . . . it's costing you a **lot of money!**

The best answer yet developed to cut corrosion costs down to the bone is a Quelcor In-Plant System.

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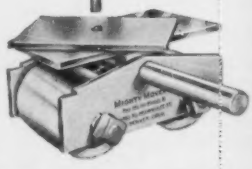

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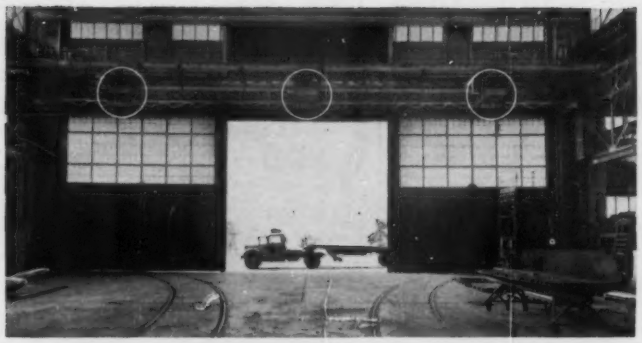
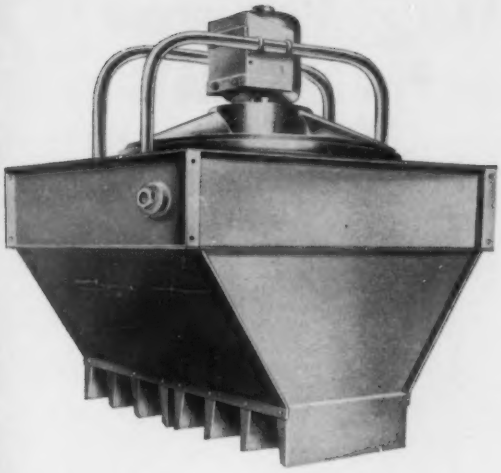


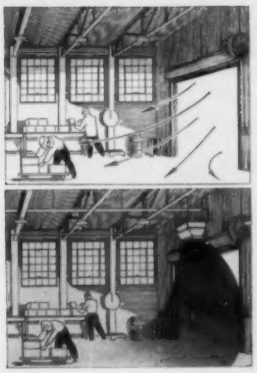


open doors

in cold weather can cause labor unrest

...eliminate cold blasts with

WING DOOR HEATERS



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1—Cold drafts rush in.
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Avoid these ill effects by installing Wing High Velocity Door Heaters.

As soon as doors are opened a curtain of hot air covers the open doorway. Workers inside then feel only a comfortable, warm gentle air movement. Wing Door Heaters use little steam as they operate only when doors are open. Actuation is by thermostat or a door switch or both. Write for Bulletin DH-2A.

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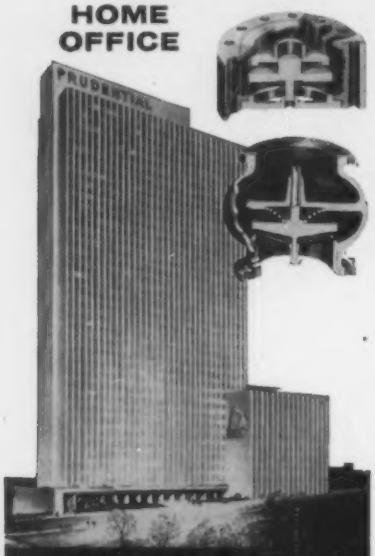

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Water hammer is effectively controlled by Williams-Hager *Silent* Check Valves. Troublesome noises are eliminated, and piping, pumps and other components are protected from damage.

Write for Bulletins:

No. 654 on the Valves

No. 851 on Cause, Effect and Control of Water Hammer

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Our 70th Anniversary • 1886-1956

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DATA FILE

(Begins on page 200)

406 **Portable Electric Tools**—This standard catalog, Form 10, 24 pp, features portable electric tools, including electric drills, bench-drill stands, hole saws, buffing and polishing kits, sanders, polishers, grinders, hammers, saw blades, vacuum cleaners and others. Photos included. The Black & Decker Mfg. Co.

407 **Pipe Tool Ordering Guide** — Catalog 2-51, 8 pp, covers company's line of threaders, cutters, vises, dies, tongs and wrenches; gives prices. Armstrong Bros. Tool Co.

408 **On Spot Welding**—"Spot Welding from One Side—With a Portable Gun," 12 pp, describes an inert-gas-shielded tungsten-arc spot welding process. Over 30 tables, weld cross-section and application photos, drawings and graphs are included. Sections of text cover when to consider spot welding from one side, how the equipment operates, standards and test procedures, factors affecting weld. Air Reduction Sales Co., Div., Air Reduction Co., Inc.

409 **Industrial Tools**—Hand tools and shop tools for production lines, maintenance work and service departments are featured in 108-pp Industrial Catalog 54-1. Loaded with pictures and tool facts, the book describes in detail the complete line of over 4,000 tools—including chests and cabs, wrenches and sockets, screwdrivers, pliers, pulling equipment, tool assortments and many others. Snap-On Tools Corp.

VIBRATION CONTROL

410 **Vibration Control Specifications**—Bulletin F2B shows how to write vibration control specifications for all types of air conditioning and related equipment regardless of the operating conditions. Contains a definitive treatment of factors involved in selection of various isolation media, with particular attention to the influence of existing job conditions. A selector chart included. The Korfund Co., Inc.

411 **How to Cut Vibration** — The use of Vibra-Mount felt in reducing machine vibration and accompanying noise is covered in this 20-pp illustrated booklet. Tells where this shock-absorbing felt is used effectively, how to select the proper mount, and how to install it. Cost information is provided, other felt products are listed. American Felt Co.

412 **Vinyl Machinery Mount** — Advantages of company's vinyl machinery mount are outlined in this illustrated brochure. Installations in a representative plant are shown. Clark, Cutler, McDermott Co.

BOILERS, GENERATORS

414 **Steel Boilers**—Revised General Catalog 80, 32 pp, is a condensed but complete product guide on company's high and low pressure steel boilers. Also included are full descriptions and illustrations of water heating products, both direct fired and storage types as well as indirect water heating coils. Pages on boiler support brackets, structural steel suspension and induced draft fans, as well as pictures of installations are included. Kewanee-Ross Corp.

415 **Packaged Boilers**—This 16-pp illustrated catalog describes manufacturer's new Type VP Package boiler. Following a section of background information, is an outline of principal design features of these boilers, which are shop assembled and provide steam capacities from 4000 to 40,000 lb per hour. Space requirements are shown in a table along with specifications. Combustion Engineering, Inc.

416 **Packaged Generators**—This 16-pp catalog covers a new series of packaged steam generators in sizes from 10,000 to 46,000 lb of steam per hour. Gives capacities, dimensions, construction features. Instrumentation is discussed. Illustrations include sectional drawings and installation photos. Booklet also provides a selection chart on firing equipment and controls. Foster Wheeler Corp.

417 **Automatic Boilers** — Bulletin BE-4 describes operation and advantages of Continental automatic boiler's spinning gas technique—a method of obtaining maximum heat transfer

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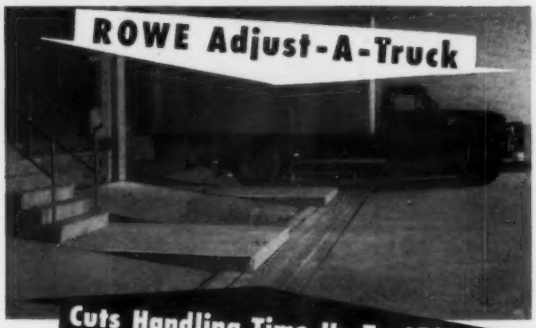

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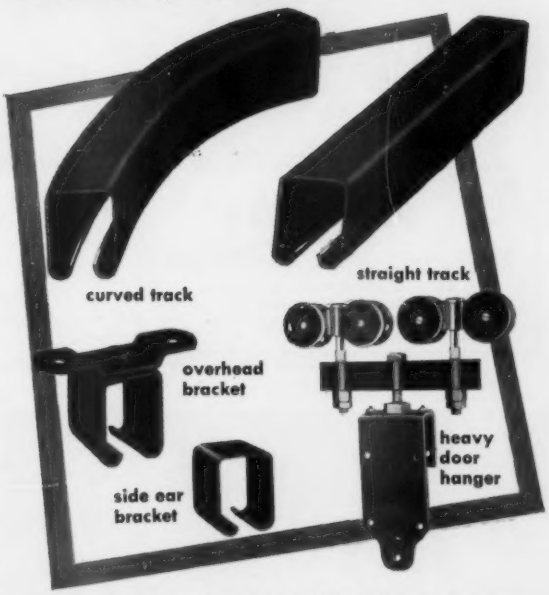

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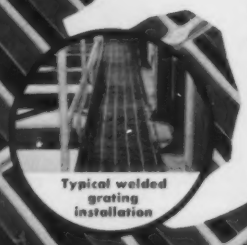

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DATA FILE

(Begins on page 200)

with a simplified design. Shows cutaway view of boiler construction; illustrates hinged doors and method of injecting air through static, turbine-like vanes into burner. Boiler Engineering & Supply Co., Inc.

418 **Package Boilers**—This 12-pp booklet on package steam generators describes the formulas behind all package steam generators, and illustrates how installation of a package steam generator can raise steam capacity in an existing boiler room without extensive structural changes. Shows plant operators how to make survey of their own steam requirements. Cyclotherm Div., National-U. S. Radiator Corp.

WATER TREATING

419 **Industrial Filters**—How industrial filters can lower production costs is the theme of 10-pp Bulletin 651. Several simple case histories—from filtering city water to the filtering of recirculation water from cooling towers and spray ponds—are cited. Company's new line of 1WF filters is featured, including sectional views, typical installation drawings, dimension charts. R. P. Adams Co., Inc.

420 **Chemical Control and Testing** — The need for intelligent chemical control and testing to assure the success of a water conditioning program is described in this 6-pp pocket-sized folder. Emphasizes need for explicit control limits and chemical tests to show that these limits are being met, and the proper technical skill required to prescribe these limits. Hall Laboratories, Inc.

421 **Feedwater Treatment**—Process Bulletin B1, "Treatment of Boiler Feedwater by the Direct, or Internal Method," discusses advantages of direct treatment, as a complete treating program or as a supplement to external systems. Explains why direct treatment is convenient, economical, and complete, and points out how it improves steam quality and reduces boiler maintenance costs and down-time. National Aluminate Corp.

SPACE, PROCESS HEATING

422 **Plumbing, Heating Supplies**—Edition H is the current edition of this company's 126-pp general catalog on plumbing and heating repair parts, tools and accessories. Indexed and generously illustrated; gives sizes, intended uses. J. A. Sexauer Mfg. Co., Inc.

424 **Unit Heaters** — Catalog 155, 32 pp, presents unit heaters for steam and hot water in vertical and horizontal delivery and power-throw types. Covers design features and provides performance and capacity data. Also provides information on unit heater selection, sound ratings, locating unit heaters, motor wiring and control. Piping and installation suggestions are included as well as typical unit heater specifications. Modine Mfg. Co.

425 **On Unit Heaters**—Latest improvements, specifications and performance data for Herman Nelson horizontal and vertical unit heaters are covered in 36-pp Bulletin 700A. Includes complete hot water and steam performance tables, dimensions, selections, applications, descriptions of cabinets, elements, motor mountings, fans and accessories, controls. Also provided are suggested layouts, piping diagrams, other data. American Air Filter Co., Inc.

426 **Revolving Unit Heaters** — Bulletin HR-6A, 16 pp, features revolving unit heaters for industrial plant heating, presenting design and construction details and showing typical installations. Engineering data, mounting heights and coverage, and dimensions are tabulated, and dimension drawings are included, along with installation planning tips and specifications. L. J. Wing Mfg. Co.

427 **Electric Heat, 101 Ways**—Principal industrial heating applications and methods are described in "101 Ways to Apply Electric Heat," a 32-pp booklet. Illustrated case histories show how metal-sheathed electric heating units are being used. Physical aspects of installation are detailed along with a discussion of the problem, solution and advantages obtained.

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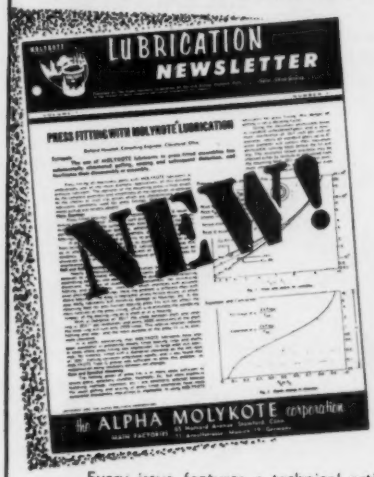

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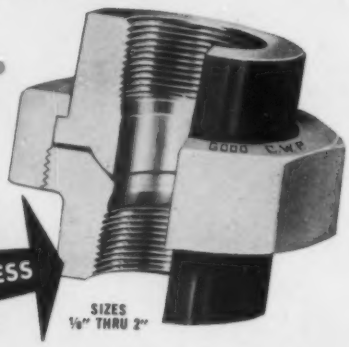

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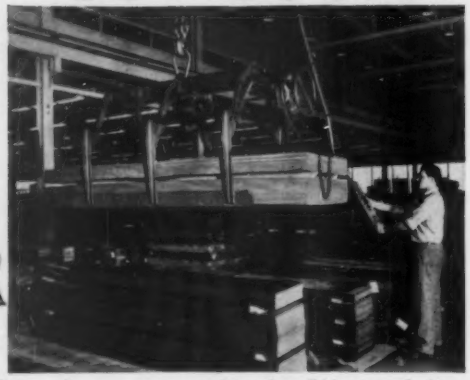

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DATA FILE

(Begins on page 200)

To illustrate liquid heating, diagrams and photos show best applications for the elements and heaters. Similar treatment is accorded problems of heating air and gases; melting soft metals and viscous materials; and heating machinery. Edwin L. Wiegand Co.

428 **Industrial Ovens** — Engineering, manufacturing and installation of processing ovens are described in Bulletin D-53-20, 16 pp. Covers oven types, application to industry source of heat, selection of heater, control of heat, distribution of heat. Photos show typical oven installations, and a complete modern finishing process is presented. Newcomb-Detroit Co.

429 **Industrial Ovens** — Thirteen types of company's Conventioneered ovens, which apply principles of forced convection heating to various industrial processes, are illustrated and described in 12-pp Bulletin 200. These ovens serve foundries, metal finishers, plastics producers. The W. W. Sly Mfg. Co.

LUBRICATION

430 **Lubricant Data Book** — The 16-pp current edition of this company's popular Lubriplate Data Book offers practical information on lubrication of machinery. Gives product data on grease type and fluid products, hydraulic oil, compressor oil, motor oil. Suggestions on applying lubricants under normal and special conditions are provided. Several pages are devoted to lubricant recommendations for equipment used in a variety of industries—bottling plants, chemical and food processing, metalworking, iron and steel plants, textile plants, woodworking, pulp and paper machinery, sewage disposal plants. Lubriplate Div., Fiske Bros. Refining Co.

431 **For Better Lubrication**—Advantages of company's lubricants which are specially compounded for lubrication of reduction gear drives are outlined in this pocket-sized folder. Features which assure smooth, trouble-free gear drive performance and lower maintenance costs are listed. Gulf Oil Corp.

432 **Multi-Purpose Grease** — This bulletin describes Gargoyle Grease BRB No. 1, intended to provide correct lubrication for practically all normally loaded anti-friction and plain bearings. Tells how it resists leakage, affords protection. Socony Motor Oil Co., Inc.

433 **"Fringe Area" Lubrication** — Revised Bulletin 103A lists 17 types of molybdenum disulfide lubricants and features an explanation, with diagrams, of applications in extreme bearing pressure, and high, low and normal temperature lubrication. Five new lubricants are included. A selector chart describes each type, kind of carrier used in it, temperature range in which it operates best, and method of application. The Alpha Molykote Corp.

434 **Centralized Lubrication** — Pocket-sized 24-pp, Form 34-22, called "Ask Anyone in Industry" describes in comic-book form the hazards and inefficiency inherent in conventional lubrication practice and promotes use of centralized lubrication — in the form of Alemite Accumeter measuring fittings. Shows how these are connected by tubing to a lubrication pump which is controlled by a timer. Alemite Div., Stewart-Warner Corp.

MAINTENANCE

435 **Basic-Roofing Information**—"What You Should Know About Your Roof" is a 40-pp clearly illustrated booklet which tells what makes a roof fail, how to recognize signs of roof deterioration, what to do to keep a roof in good condition. Discusses recommended roofing practices, essentials of a good re-roofing job. Johns-Manville.

436 **Hot-Dip Galvanizing**—How hot-dip galvanizing is prolonging life of industrial equipment is stressed in this 16-pp booklet. Photos, showing galvanized equipment in use accompany brief text explaining how this process of covering iron and steel with a protective coating of zinc serves to prevent rust. The galvanizing procedure is explained and illustrated. Coating

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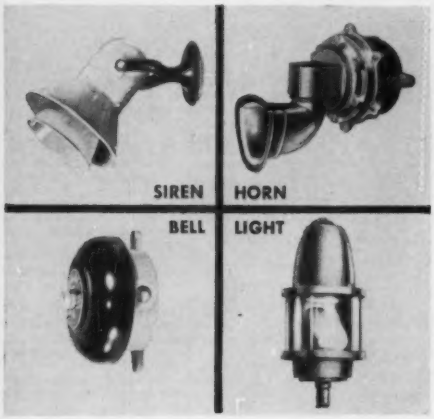

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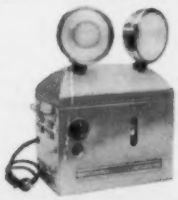

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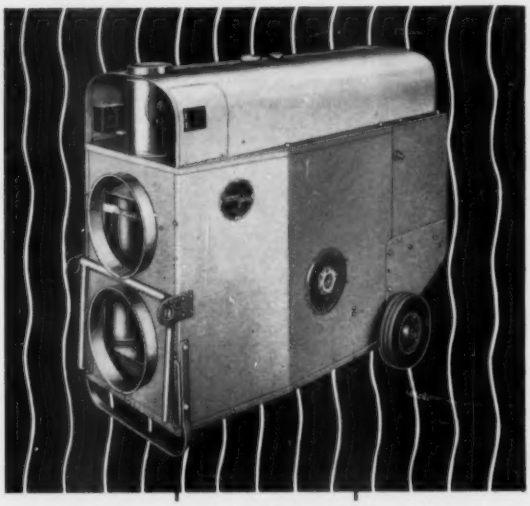

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DATA FILE

(Begins on page 200)

comparison charts show how hot-dip galvanizing compares with other types of coatings as to rust resistance, dimension limits, shock resistance. American Hot-Dip Galvanizers Assn., Inc.

437 On Rust Prevention — This 1956 General Catalog, 38-pp Form 255, presents a treatise on rust prevention with illustrations of Rust-Oleum uses and applications throughout industry. Included are 102 color chips showing variety of colors available in primers, short oil type coatings, oil field finishes, restful color group finishes, machinery and implement colors, long oil type coatings, calvinoleum coatings, heat resistant coatings, chemical resistant coatings. Rust-Oleum Corp.

438 Protective Paint—Thirty-five case histories of successful use of protective coatings based on chlorinated rubber are included in this 20-pp bulletin, "Protection With Parlon." Photos show water and sewage works, paper mills, storage tanks, and chemical and food processing plants where these coatings have had long-term exposure to corrosive environments. Includes performance data, instructions for application. Hercules Powder Co.

439 Insulation Coating — This 32-pp illustrated handbook, Form L-17, presents the advantages of company's NoDrip insulation coating for preventing condensation drip from metal, concrete, brick, wood, plaster or composition surfaces. Lists applications and describes methods of applying. Contains tabulated data on quantity required to cover various size tanks and pipe. J. W. Mortell Co.

440 Painting with Aluminum—This helpful booklet discusses advantages of aluminum paints, describes three basic types for non-absorbent surfaces, for weather-exposed wood, and for heated surfaces and those not exposed to weather. Typical maintenance applications are covered in text and picture, and practical suggestions for good results included. Use of aluminum paint on steel, galvanized metal, wood, masonry is detailed. Aluminum Company of America.

441 Paint Work Book—Bulletin 760, about 12 pp, is a practical manual giving painting data in charts, tables, diagrams and illustrations. Factors relating to use of company's protective coatings in mild to severe corrosive service are covered. Coatings and related primers are presented, along with surface preparation, priming, application methods and maintenance instructions. Care and cleaning of brushes and spray equipment is explained. A table gives chemical resistance rating of each coating to over 200 corrosive agents. Limitations of each coating are also given and cost factors cited. The U. S. Stoneware Co.

Postage-free Reader Service Cards make it easier to order catalogs. Cards are provided on pages 195 and 196.

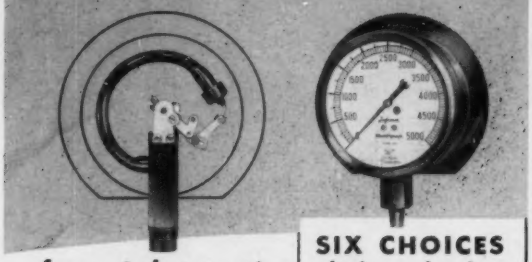
442 Building Maintenance — Handbook 7 offers 64 pp of information on floor surfacing, leak stoppers, external wall sealants, roadpatching, roofing materials. Includes instructions for applying them. Flexrock Co.

443 Better Floor Care — This illustrated folder describes products designed to aid efficient floor care. Lists combination Scrubber-Vac machines, conventional scrubbing-polishing machines, steel-wool pads, applicators, vacuum cleaners, mop trucks and other mopping equipment. Included are waxes, sealers and cleansers. Finnell Systems, Inc.

444 For Fast Floor Repairing — This illustrated bulletin covers Kwik-Roc, a fast and tough hardening material for repairing holes and cracks in concrete floors. Tells how to prepare surfaces for Kwik-Roc, how to mix, place, and store it. Includes service recommendations. A. C. Horn Co., Inc.

445 Industrial Vacuum Cleaning — Twelve-pp Bulletin 155 B describes both stationary

STAINLESS!



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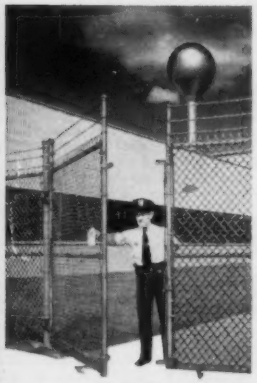

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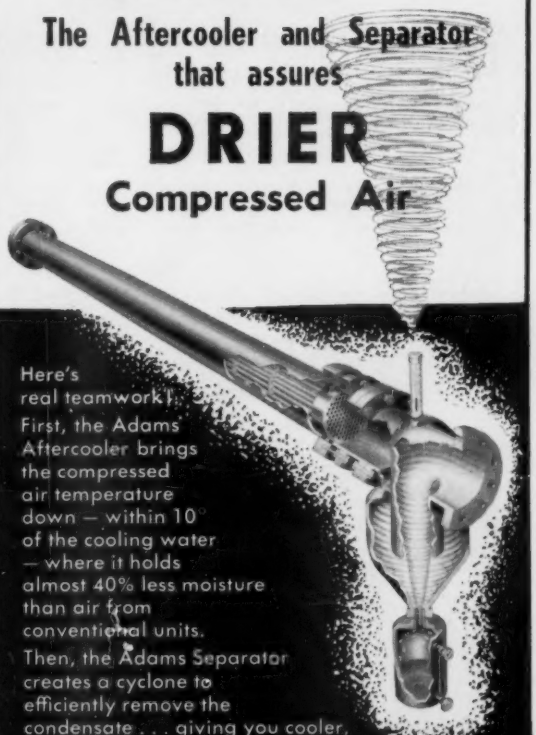

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DATA FILE

(Begins on page 200)

vacuum cleaning equipment and portable industrial vacuum cleaners, the latter in both light- and heavy-duty types. Recent improvements in collection and dumping methods are covered, and photos show application to conveying, reclaiming, bench work and removal of water. Specifications and ratings are included. Spencer Turbine Co.

446 **Off-the-Ground Maintenance** — Bulletin G205R, 8 pp, discusses the subject of controlling costs when maintenance goes above arm's reach. Describes trestles, swinging scaffolds, aluminum scaffolds, ladder scaffolds, step ladders, extension ladders, storage racks and other equipment designed to handle every type of overhead maintenance problem. Pictures applications. The Patent Scaffolding Co., Inc.

DUST CONTROL

447 **Dust Control, Blast Cleaning**—Bulletin 1210, 24 pp, fully illustrated, describes manufacturer's line of blast cleaning and dust control equipment, accessories. It is indexed according to equipment, type and purpose. Lists three methods of application. Pangborn Corp.

448 **Dust Control** — "Engineered Efficiency in Dust Collection and Recovery," 36 pp, discusses industrial dust recovery from standpoint of nuisance abatement, waste avoidance, hazard elimination. Shows effect of variation in particle size, distribution and specific gravity of dust on efficiency of the dust collecting system. Buell Engineering Co., Inc.

449 **Dry-Type Filters**—Bulletin 600, 8 pp, describes company's Staynew ventilation and air conditioning filters. Specifications, engineering, performance and installation data covering dry type panel filters for the removal of air-borne impurities given. Dollinger Corp.

450 **Dust Filter** — **Design**, application and benefits of company's AC dust filter are described in illustrated 26-pp Bulletin 559. Filter performance curves, principle of air filtration, filter comparison charts, woven vs felted filtering media are featured, along with technical data on design, capacity ratings, dimensions, velocity, air volume and pipe friction tables. Installation photos and drawings of typical equipment layouts are included. The Day Co.

451 **Flexible Hose**—A set of five bulletins (Nos. 40 through 44) are of interest to plant engineers concerned with the design, installation or purchase of flexible hose for dust and fume control, air conditioning and materials handling. They provide general information, data on installation, application suggestions, technical data and prices on hose, duct and accessories. The Flexaust Co.

CONSTRUCTION

452 **Glass for Industrial Use**—How glass is used and how to choose the proper type for the application are covered in 12-pp Catalog 56-1. Discusses glass according to function; light diffusion and glare reduction; decoration; protection; and heat absorption. Photos showing various finishes and typical installations are provided, along with performance data, selection and installation tips, light transmission ratings and other data. General advantages offered by company's line of glass are also detailed. Mississippi Glass Co.

453 **Window Modernization**—How to modernize old windows with company's glass blocks is told in 8-pp Bulletin GB-104. Selection data is included, along with photos of typical installations. Pittsburgh Corning Corp.

454 **Glass Blocks** — This 24-pp catalog describes company's glass block and its functions, and lists various glass block patterns manufactured, including light and solar heat controlling blocks, with details on functional advantages of each specific pattern. Included are instructions and construction details for both large and small-size panel installations in steel, wood frame, brick or brick veneer construction. Table of dimensions; a section on how to calculate illumination and brightness; and tables on solar heat control and fuel savings included. Owens-Illinois Glass Co.

455 **How to Glaze with Plexiglas**—Sixteen-pp Booklet PL-23 gives detailed information on glazing industrial and other buildings with flat panels of the acrylic plastic Plexiglas. Written for plant engineers concerned with frequent breakage of windows or other glazing problems. Gives properties and behavior of this sheet. Plastic Dept., Rohm & Haas Co.

456 **Panel Wall Construction**—The advantages of company's M-Type Q-Panel walls are outlined in 12-pp Bulletin Q-35-55. Includes installation photos, diagrams, specifications, as well as drawings, pointing out structural details. H. H. Robertson Co.

457 **For Stairway Construction**—This 12-pp illustrated booklet describes the use of this company's Junior channels in stairway construction. Provides specifications and shows some of the buildings in which the channels have been used as stair stringers. Tables give size and weights, and show allowable loads. Jones & Laughlin Steel Corp.

458 **Steel Floor Plate**—Skid resistance and other advantages of multigrip rolled steel floor plate are stressed in this illustrated bulletin. Also gives dimensions, weights, data on allowable loads. Typical uses of the floor plate are pictured. United States Steel Corp.

459 **Non-Slip Flooring**—Algrip, an abrasive rolled steel floor plate described as non-slip even on steep inclines, is the subject of Booklet AL-29, 8 pp. Discusses safety features; gives fabricating data. Alan Wood Steel Co.

460 **Metal Grating Handbook** — Sixteen-pp Form 500 is data and specification manual covering all types of grating, open steel floor armor, stair treads, vessel liners, decking and drain grates. Contains safe load tables for basic types of gratings, panel width constant charts, tables on standard widths and types of steel treads, types of anchors used for grating. Klemp Metal Grating Corp.

461 **Steel Grating and Treads**—Bulletin 2486, 16 pp, describes types, sizes and load characteristics of company's line of electroforged steel and interlocked aluminum grating and treads. Points out advantages in design and construction resulting in greater safety, pictures applications. Blaw-Knox Co.

462 **Air Tools, Paving Breakers**—These two bulletins describe company's latest models of paving breakers and air tools for plant construction and maintenance work. Bulletin PB1 gives features and specifications on heavy-duty, medium-weight and lightweight paving breakers, as well as tools for use with them. Bulletin ST-100 describes and gives specifications for clay spaders, trench diggers and backfill tampers. Gardner-Denver Co.

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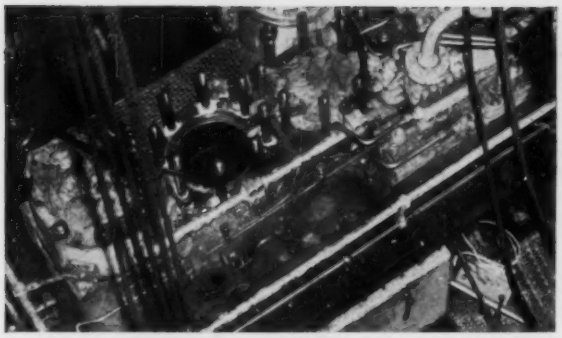

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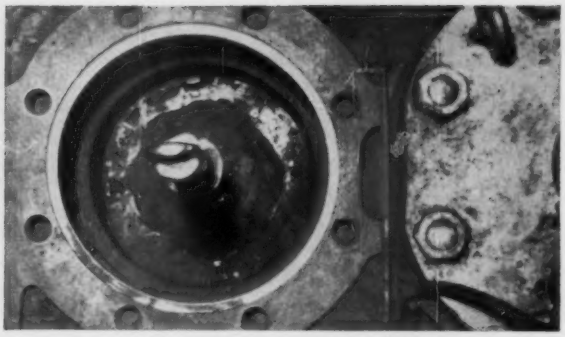

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DATA FILE

(Begins on page 200)

MECHANICAL POWER TRANSMISSION

463 **Roller Chains, Sprockets**—Catalog 754, 64 pp, describes, illustrates a line of roller chain stock sprockets, including minimum bore sprockets for reboring, also finished bore and Taper-lock bushed sprockets which are ready to use. Tables show speed ratios for sprocket combinations, standard keyways and setscrews. Includes chain selection and application data, installation and lubrication recommendations, chain length calculations, dimensions and price lists for single and multiple strand roller chains. Diamond Chain Co.

464 **Sprockets and Chain**—Bulletin A-624 24 pp, is compiled to provide plant engineers with all data required for selecting and ordering roller chain and sprockets. Devotes a page to Taper-Lock sprockets for each size of chain from 40 to 100, giving sectional drawing, dimensions, number of teeth, maximum stock bore available, weights, prices and other data. Another page covers Taper Lock bushings; and full information is given on riveted and cotter-type roller chains. Dodge Mfg. Corp.

465 **Power Drives**—Book 2447, 28 pp, features company's line of gearmotors and Motogears, and includes selection data together with features of construction, load classifications, dimension tables, overhung load ratings and mounting assemblies. Design features are illustrated through photos and cross-sectional views and dimension drawings included. Link-Belt Co.

466 **Power Transmission Equipment**—Form 1200, 12 pp, describes a full line of conservatively rated equipment for various power transmission requirements, including flexible couplings, variable speed pulleys, variable speed belts and sheaves, variable speed transmissions, motor bases, and universal joints. Dimensional and capacity data are tabulated. Lovejoy Flexible Coupling Co.

467 **Spacer Coupling**—Of special interest to plant engineers concerned with operation of many pumps is Manual 4838 on this company's Type F Steelflex spacer coupling which has a quick-disconnect feature. Step-by-step illustrations show how to install, remove coupling and lubricate it during assembly. Process pump selections are tabulated, dimensional data included. The Falk Corp.

468 **Fluid Drive**—Eight-pp Bulletin 9819 describes and illustrates adjustable speed Gyrol fluid drives, 1- through 25-hp, giving advantages and applications. Components and operation are covered in detail and selection tables are provided for direct connected and V-belt types. American Blower Corp.

"Make it fast, young fellow, this is my busy day!"

469 **Improved V-Belts**—This literature on company's Vulco rope drives explains how this rope with concave sides is designed to fill out to a precise fit in the sheave groove, to provide less wear, more pulley contact and more sure power when needed. The Gates Rubber Co.

470 **Adjustable Speed Drives**—Bulletin PB-4700-1 describes company's packaged adjustable speed drives—covering latest developments in design and construction. Tells how these packaged, pre-wired, pre-assembled units provide flexibility of d-c motor performance from an a-c power supply, and offer simple, convenient speed adjustment without intermediate speed changing equipment or line shafting. Crocker-Wheeler Div., Elliott Co.

471 **Adjustable V-Belt** — This 8-pp catalog covers company's Veelos TD and TE V-belt designed to reduce installation and operation costs on big drives. Studs, cup-washers and T-screws of the belt are illustrated, and installation and operation characteristics explained. Booklet includes directions on how to measure, to couple and uncouple, and to install belts. Manheim Mfg. & Belting Co.

472 **Flexible Couplings** — Condensed Engineering Catalog 51-A contains excellent data on the choice and use of company's flexible metal couplings for power transmission. Tells advantages of these couplings and discusses design principles. Double-flexing and floating shaft types, light duty couplings and types for special applications are described and pictured in detail. Thomas Flexible Coupling Co.

OTHER EQUIPMENT

473 **Synthetic Fluids, Lubricants** — Form F-6500D, 52-pp, on synthetics, covers properties, applications, and characteristics of these poly-alkyline-glycol derivatives. Describes uses as mechanical lubricants, hydraulic fluids, rubber and textile lubricants, heat-transfer fluids, anti-foam agents, solvents, and formulation components. Engineering data is presented in the form of tables and charts, and application

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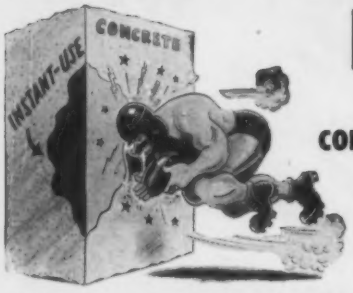

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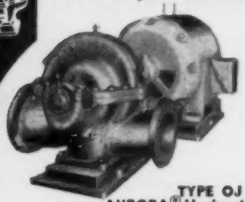

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DATA FILE

(Begins on page 200)

photos included. Carbide and Carbon Chemicals Co., Div., Union Carbide and Carbon Corp.

474 **Neoprene Design Book**—This illustrated bulletin discusses the properties of Neoprene, showing how they are utilized in products made from this chemical rubber. Covers its toughness, hardness range, air retention, performance under load, at extreme temperatures, flame and chemical resistance. Elastomers Div., E. I. du Pont de Nemours & Co.

475 **Spray Painting**—Advantages of an electrostatic spray painting process are discussed in this 16-pp bulletin which contains diagrams of both the disk atomizer and bell-shaped atomizer. Production line examples show applications in the finishing of industrial products ranging in size from automobile chassis to door knobs. Technical laboratories where a variety of conveyors are available for testing of electrostatic spray painting are also shown. Ransburg Electro-Coating Corp.

476 **After Cooler**—Bulletin 130, 8 pp, explains functions of company's Aero after cooler in removing moisture from compressed air and gas. The apparatus is described and illustrated with diagrams and photos. Included also are diagrams and illustrations of applications in liquefication systems. Niagara Blower Co.

477 **Detergent Oils**—How to clean sludge out of hydraulic and lubrication system without shutting down machines is told in Technical Bulletin 44. Also tells how continued use of these highly detergent oils keeps equipment as clean as new. Sun Oil Co.

478 **Equipment Selector Charts** — Bulletin CE-50, 20 pp, contains selector charts on corrosion-resistant equipment for process industries. Tables cover general considerations in selection of material, physical properties, corrosion resistance, techniques and skill in manufacture of equipment. Describes rubber and plastic pipe, tubing and fittings; valves; pumps; rubber-lined tanks. American Hard Rubber Co.

479 **Ductile Iron**—Cast iron that can be bent is described in this 28-pp revised edition, with tables, charts and photos. Photos show applications of ductile iron castings, and bulletin lists typical applications in various industrial fields. The International Nickel Co., Inc.

480 **Corrosion - Proof Materials**—Bulletin CC-3, 16 pp. gives basic information on company's corrosion proof construction materials, covering chemical and physical data, estimating data and descriptions of products used for acid proof installations in the metal working, chemical, petroleum, pulp and paper and other industries. Included are sections on corrosion proof cements, tank linings, protective coatings, rigid plastic fabrications and rigid plastic pipe, plus a chart showing their resistance to chemicals. The Atlas Mineral Products Co.

481 **Swivel Joints**—Catalog G-4, 32 pp, covers this manufacturer's line of ball-bearing swivel joints as well as other products, including loading racks, manifolding lines, all-metal hose. In addition to providing dimensional and operating data on these products, this booklet is generously illustrated. Chiksan Co.

482 **Industrial Finishing Equipment**—Catalog A-657, 12 pp, describes a complete modern finishing system for cleaning, rust proofing, drying, painting and finish baking operations. Typical finishing systems handling a variety of products are pictured and details on how system can be designed to accommodate any product and meet any production requirement are furnished. The R. C. Mahon Co.

483 **Belt Fasteners** — Bulletin F-112A describes belt fasteners designed to join conveyor and elevator belts in every width. Also covers rip plates for repairing jagged rips and tears, scraper plates and applications tools. Contains photos showing installation, selection data, list prices. Flexible Steel Lacing Co.

484 **Industrial Fans**—Bulletin 702A features company's line of fan equipment for industrial air and material handling applications. Photos illustrate various types available, and complete descriptive detail and a table of general data are included. Clarage Fan Co.

485 **Pipe Insulation**—Bulletin F 1-100 features on-the-job installation photographs of cellular glass insulation for pipe temperatures between—300 and 800 F. Complete listing of physical properties, condensed specifications are given. Pittsburgh Corning Corp.

486 **Incinerators** — "The Incinerator Blue Book" is a 16-pp bulletin on incinerator developments, covering design features, methods of feeding or charging of refuse, waste analysis, and other information. An incinerator selection chart, classification of incinerators, capacity and dimension data and incinerator specifications are included. Various types of disposals, medical waste crematories, custom incinerators, utility incinerators, heavy duty incinerators, and fluefed incinerators are pictured and described. Joseph Goder Inc.

487 **Overheat Protection**—Bulletin MOPR-1, 8 pp, describes design and operation features of inherent overheat protectors—small devices built into electric motors to turn power off when windings get too hot. Includes photos and wiring diagrams illustrating operation. Metals & Controls Corp.

488 **Rigid Plastic Material**—The advantages, uses and available forms of Boltaron 6200 are presented in this catalog, about 14 pp. Gives dimensional data, tolerances, weights for sheet, bar stock, pipe, fittings and valves made of this unplasticized polyvinyl chloride. Includes thermal, electrical and mechanical properties, also detailed information on chemical resistance. H. N. Hartwell & Son, Inc.

489 **On Ventilating Systems**—Design and engineering data on company's line of ventilating fans and blowers are presented in 32-pp Bulletin 310. Includes table showing air change requirements of various types of rooms and areas, discusses details of fan operation and design, the use of ducts, special conditions which govern fan selection, design and operation of blowers. A section on how to design systems is included. Ilg Electric Ventilating Co.

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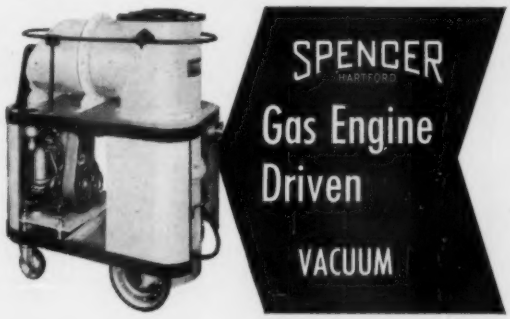

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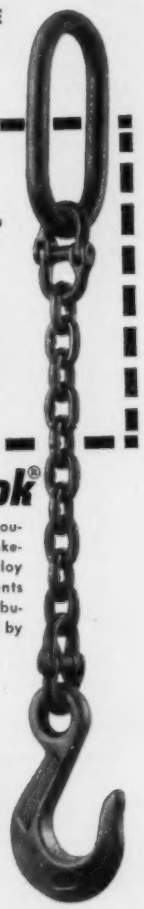

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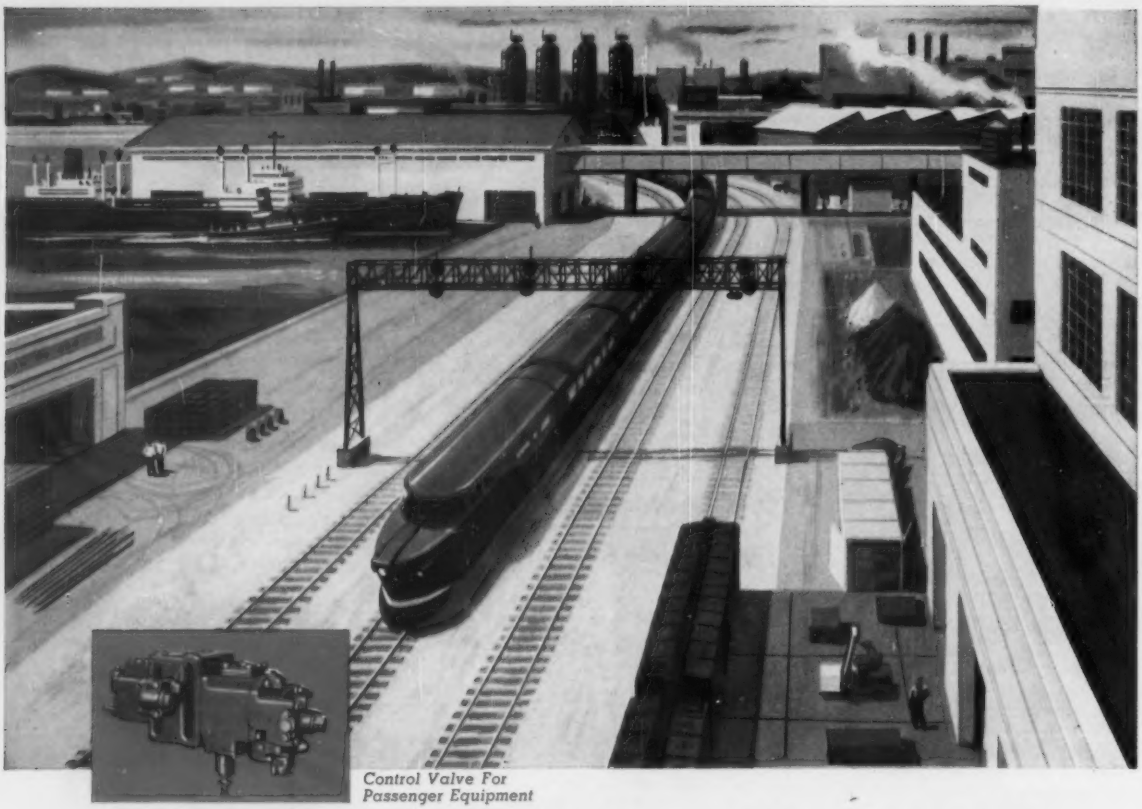

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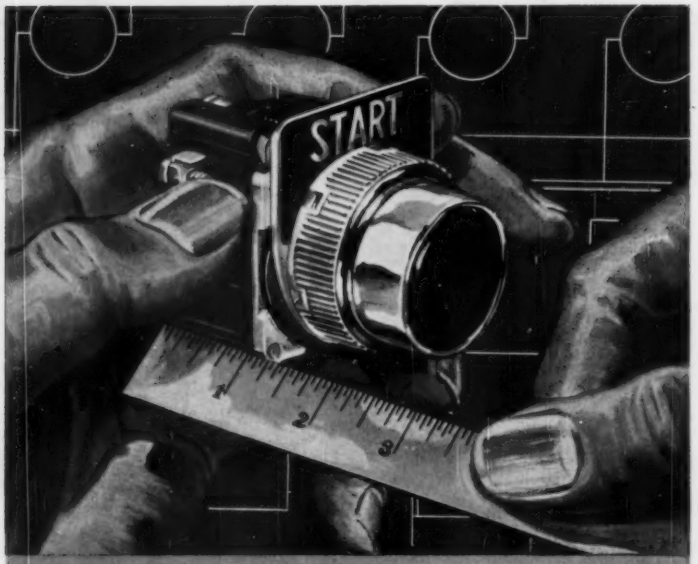

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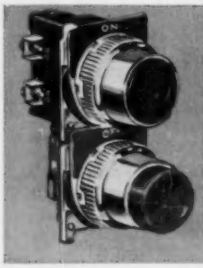

A maintained-contact pushbutton assembly that saves more than its entire cost by installation savings. New attachment with its pushbuttons mount in minutes; no fussy adjustments. Neither alignment nor spacing of units is critical. Pushbuttons will not bind or stick; always operate perfectly.

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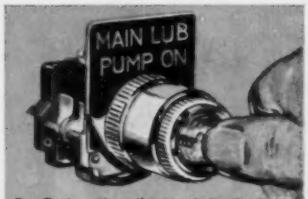

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